

HANDBOOK ON

CHEMICALS AND HAZARDOUS WASTE

MANAGEMENT AND HANDLING

IN INDIA

Jointly published by:



**CENTRE FOR ENVIRONMENTAL LAW, EDUCATION,
RESEARCH AND ADVOCACY
NATIONAL LAW SCHOOL OF INDIA UNIVERSITY**



**MINISTRY OF ENVIRONMENT, FOREST AND
CLIMATE CHANGE, GOVERNMENT OF INDIA**

Copyright @ NLSIU, 2019

All rights reserved. No part of this book may be reproduced or utilised in any form of by any means electronic and mechanical, including photocopying, recording or by any information storage or otherwise, without permission in writing from NLSIU.

ISBN : 978-93-83363-79-7

Price : INR 500/-

©National Law School of India University, Bengaluru.

www.nlspub.ac.in

Published By :

**CENTRE FOR ENVIRONMENTAL LAW, EDUCATION, RESEARCH AND
ADVOCACY**

NATIONAL LAW SCHOOL OF INDIA UNIVERSITY

P O Box 7201,

Nagarbhavi, Bengaluru-560 0242

Printed by:

Sri Vidya Printers

Bengaluru Ph: 9986659590, 9035142247

NLSIU

Table of Contents

	Page No.
Acknowledgment.....	vii
Preface	ix
List of Abbreviations	xiv
CHAPTER 1	
CHEMICALS AND HAZARDOUS WASTE - OVERVIEW AND DEFINITIONS	1
1.1 Understanding Chemical Substances.....	1
1.2 Chemical and Physical properties of Chemical Substances	3
1.3 Hazardous properties of Chemical Substances	5
1.4 Globally Harmonized System for Classification and Labelling of Chemicals (GHS)	11
CHAPTER 2	
INTERVENTIONS OF INTERNATIONAL ORGANISATIONS IN THE FIELD OF CHEMICAL AND HAZARDOUS WASTE MANAGEMENT .	26
2.1 Introduction	26
2.2 Organizations Working in the Field of Chemicals and Hazardous Waste Management at the International Level	28
2.3 Organizations working in the field of Chemicals and Hazardous Waste Management at the Regional Level	46
2.4 Definitions of hazardous waste adopted by International and Regional Organizations	55
2.5 Definitions of Hazardous Waste within the Indian Legal Framework....	60
2.6 Comparative Analysis of the Definitions of Hazardous Waste adopted by International and Regional Organizations and the Indian Legislations	62

CHAPTER 3

INTERNATIONAL INSTRUMENTS ON CHEMICAL AND HAZARDOUS WASTE MANAGEMENT AND INDIA 65

- 3.1 Background for International Regulation in Chemical and Hazardous Waste Management 65
- 3.2 Quick factsheet of the Conventions 66
- 3.3 Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal (1989). 67
- 3.4 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998..... 71
- 3.5 Stockholm Convention on Persistent Organic Pollutants (2001) 75
- 3.6 Strategic Approach to International Chemicals Management (SAICM) (2006)..... 78
- 3.7 Minamata Convention on Mercury (2017) 80
- 3.8 Indian Response and Compliance to the Conventions..... 82
- 3.9 Matrix of International Law on Management of Hazardous Wastes and Chemicals 104

CHAPTER 4

OVERVIEW OF THE CHEMICAL SECTOR IN INDIA 131

- 4.1 Background 131
- 4.2 Role of the Chemical Sector as a contributor to Indian Economy 132
- 4.3 Key drivers for growth of the Chemical Sector 135
- 4.4 The functioning of the Chemical Sector 140
- 4.5 Challenges faced in the Disposal, Storage and Transportation of Hazardous Waste 147
- 4.6 Bhopal Gas Tragedy- A Case of Inefficient Waste Disposal 149

4.7	Global outlook on the need for effective Chemical Waste Management	152
4.8	The Need for Regulation of the Chemical Sector in India	155
4.9	International Trade in Chemicals and the Indian Position	160
4.10	Indian Regulation	169

CHAPTER 5

INDIAN REGULATIONS ON CHEMICAL AND HAZARDOUS WASTE MANAGEMENT

5.1	Background	177
5.2	The Legal Framework on Chemical and Hazardous Waste in India	180

CHAPTER 6

LAW ON EMERGENCY, REMEDIAL AND PENAL ACTION IN RELATION TO HAZARDS CAUSED BY CHEMICAL WASTE

6.1.	Introduction to Chemical Accidents and Disasters: An Overview	281
6.2	Chemical and Hazardous Substance Accidents and Disasters: an overview of Environmental Consequences	284
6.3	Chemical Accidents around the World: Impact on the State of Environment	285
6.4	Chemical Accidents in India: Shortcomings of the Legal Regulations .	291
6.5	Reflecting on the Legal Framework: Which Laws were applicable?	295
6.6	Issues and Challenges in Production, Storage and Transport of Chemicals in India:	297
6.7	The Manufacture, Storage and Import of Hazardous Chemical Rules, (MSIHC) 1989 & Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, (CAEPR) 1996; A Critical Appraisal.....	300

ACKNOWLEDGMENT

The Handbook on Chemicals and Hazardous Waste Management and Handling in India is a result of the research undertaken by the Centre for Environmental Law, Education, Research and Advocacy (CEERA), National Law School of India University, Bengaluru.

CEERA expresses its gratitude to the **Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India** for granting the Three – Year project on “*Collaborative Engagement for Research, Training and Development in Handling of Chemical and Hazardous Waste*”. We express our sincere thanks to **Mr. Manoj Kumar Gangeya**, Director, MoEF & CC, and to **Mr. Dinesh Runiwal**, Scientist-D at MoEF & CC’s Office of Hazardous Substances Management, for guiding us in this project and coming up with this Handbook.

CEERA would like to express earnest gratitude to our Vice Chancellor **Prof. (Dr.) Sudhir Krishnaswamy**, for his encouragement in bringing forth our first publication under this project. We are thankful to **Prof. (Dr.) M.K. Ramesh**, our mentor and guide, for providing his rich insights and for his relentless support to CEERA and the entire team.

This handbook has been a result of the contributions from **Ms. Madhubanti Sadhya** and **Mr. Rohith Kamath**, who are the lead authors and other notable contributions from **Ms. Raagya P. Zadu**, **Mr. Raghav Parthasarathy**, **Mr. Vikas Gahlot** and **Ms. Geethanjali K.V.**, for putting in their efforts in bringing this publication.

Prof. (Dr.) Sairam Bhat
Coordinator, CEERA
Professor of Law, NLSIU

PREFACE

In the present times, the use of chemicals is crucial for the growth of any economy, bearing in mind its application in almost all spheres of human activity. It is the mainstay of several sections of the economy and contributes largely for the growth of the industrial and agricultural sector by providing raw materials to a number of industries, including textile, paper, paint, soap and detergent, pharmaceutical, bulk drugs and formulations, agrochemicals. It also has extensive domestic application. Besides use of imported chemicals in different industries, the chemical sector is an industry in its own right producing a wide array of products such as inorganic chemicals, synthetic organic chemicals like drugs and pharmaceuticals, dyes and intermediates, pigments, fine and specialty chemicals, chlor-alkali, pesticides, colorants and alcohol based chemicals. India ranks sixth in the world in the production of chemicals and fourth in the production of agro-chemicals. India accounts for 16 per cent of the dye stuff and dye intermediaries and is a global supplier of dyes. Excluding pharmaceutical products, the chemical industry in India ranks 14th in global exports, employs more than 2 million people and its value is expected to rise to 304 billion dollars by 2025.

While the use and importance of the chemical sector as one of the drivers of the economy cannot be denied, the harmful effects that some chemical substances and the hazardous waste generated through their use pose must not be disregarded. Chemical substances and hazardous waste by their very nature and physical characteristics often lead to significant hazards. Directly or indirectly, they pose major threats to human health and the environment if not managed or utilised cautiously. The hazardous nature of chemical substances and waste and the sheer magnitude of the Indian chemical industry, the wide spectrum of products manufactured and the impact that the industry has on the safety and livelihood of the persons engaged with the sector, makes it incumbent on the state to devise a regulatory mechanism for the chemical industry. In keeping with the requirements of the industry and the challenges it can pose, especially in terms of environmental and health risk, the country has devised a comprehensive legislative framework for the management of chemicals.

The Handbook on Chemicals and Hazardous Waste Management and Handling in India endeavours to give a broad overview of the legislative and regulatory framework governing the chemical sector in India. Designed to serve as a ready reckoner for stakeholders working in the field of chemicals and hazardous waste, such as members and officers of the Pollution Control Boards, allied institutions of the Ministry of Environment, Forest and Climate Change, other regulatory authorities, officials and employees of hazardous waste management companies and chemical industries, importers and exporters of chemicals and waste, the Handbook outlines the core objectives of the different Acts, Rules and Regulations that regulate different aspects of chemicals and hazardous waste. Much of the legislative framework in India that governs chemicals and hazardous waste owes its origin to different Multilateral Environmental Agreements on hazardous waste, to which India is a signatory. The Handbook also delineates the core principles of five major Conventions on hazardous waste and the obligations that the country has to fulfil in furtherance of their objectives. Spread across six chapters, the Handbook presents to its readers a holistic picture of the chemical sector in India and attempts to apprise them about the fundamental concepts that influence and govern chemical and hazardous waste management and handling in the country.

Understanding the properties of chemical substances and hazardous waste is pertinent, since it enables persons dealing with these substances to identify their nature and gauge how the substances could react under different conditions. The *First Chapter*, 'Chemicals and Hazardous Waste: Overview and Definition' gives an overview of chemicals and hazardous wastes and delineates the physical, chemical and hazardous properties of chemical substances and hazardous waste that aids in their identification. The chapter also discusses the Globally Harmonized System for Classification and Labelling of Chemicals, the internationally harmonized system of organizing and labelling chemicals and the criteria adopted by GHS for classifying chemical substances and mixtures according to their health, environmental and physical hazards.

The *Second Chapter*, sheds light on the interventions of the international and regional organisations in the field of chemical and hazardous waste management. Initiatives taken

up by international organizations to the likes of United Nations Environment Programme (UNEP), Organisation for Economic Cooperation and Development (OECD), Global Environment Facility (GEF), International Maritime Organisation, Inter-Organisation Programme for the Sound Management of Chemicals and regional organizations like the European Union, the African Union, and the North American Agreement on Environmental Cooperation are delineated. The chapter presents the definition of hazardous waste adopted by the different organizations and a comparison is made between the definition of 'hazardous waste' in the legislative framework in India in contrast to the ones adopted by international and regional organizations, to trace the genesis of the definitions adopted in India and to gauge how far are they attuned to the international standards and descriptions.

The *Third Chapter*, gives a brief summary of the five international instruments on chemical and hazardous waste, namely the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury and the Strategic Approach on International Chemicals Management. The chapter presents salient features of the Conventions aided by illustrative descriptions. The country's obligations under each of the Conventions, steps taken towards domestic application and its status of compliance are also presented in the chapter.

The *Fourth Chapter*, gives an overview of the chemical sector in India. The chapter focusses on the role of the chemical sector as a contributor to the Indian economy, the functioning of the chemical sector and the categories of chemical manufacturing industries, the regulatory framework governing production and consumption of major chemicals, chemical waste disposal and treatment facilities and their availability and coverage across the states. The major challenges faced in the storage, disposal and transportation of hazardous waste and the need for regulation of the chemical sector is also delineated. The chapter presents a brief outline of the international trade in chemicals and the Indian position regarding the same, the arguments for and against international trade in

chemical and waste and the international and Indian regulations governing international trade.

The *Fifth Chapter*, discusses the Indian regulations on chemical and hazardous waste management. A detailed analysis of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 [as amended in 2000], the Ozone Depleting Substances (Regulation and Control) Rules, 2000 [as amended in 2014] the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 [as amended in 2019], the E-Waste Management Rules, 2016, [as amended in 2018], the Plastic Waste Management Rules, 2016 [as amended in 2018] and the Batteries (Management and Handling) Rules, 2001 [as amended in 2010]. The chapter presents the scope of application of these Rules, criteria identified for the classification of waste, identified stakeholders and their responsibilities and the different mechanisms identified for the treatment, storage, disposal, labelling and transport of waste and the liabilities and penalties prescribed for their contravention in a simple and reader friendly format. Some best practices adopted by different countries in regulating and managing hazardous waste are discussed. A tabular representation of the measures adopted by all Indian states in the management of hazardous waste has been added in this chapter.

The *Sixth Chapter*, lays down the law on emergency, remedial and penal action in relation to hazards caused by chemicals and hazardous waste. The effects of various disasters and accidents in the chemical industry which have happened in the past, across the world and their environmental consequences have been succinctly described. This chapter also presents a critical appraisal of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, (CAEPR) 1996. The shortcomings of the existing provisions with reference to the management of the accidents and emergency preparedness in the country are also discussed.

This Handbook prepared and published as the first in a series of publications under the Three-Year Project of the Ministry of Environment Forest and Climate Change on

Collaborative Engagement for Research, Training and Development in Handling of Chemical and Hazardous Waste, is designed to serve as a reference guide to the concerned stakeholders to aid their understanding of the chemical industry, the chemical and hazardous waste generated and the legislative and regulatory mechanism governing every aspect of handling and managing chemicals and hazardous substances in India.

The team acknowledges the contributions made by Ms. Shyama Kuriakose, Independent Consultant, Ms. Lianne D'Souza, Ms. Harita Ramachandran, Ms. Priyadarshini Venkatesh, and Ms. Nayana J. M, Students from School of Law, Christ Deemed to be University in the preparation of the Handbook.

Prof. (Dr.) M.K. Ramesh	Prof. (Dr.) Sairam Bhat	
Madhubanti Sadhya	Rohith Kamath	Raagya Zadu
Geethanjali K V	Raghav Parthasarathy	Vikas Gahlot

LIST OF ABBREVIATIONS

AU	African Union
BRICS	Brazil, Russia, India, China and South Africa
CCC	Carriage of Cargoes and Containers
ChP	Chemicals in Products
CPCB	Central Pollution Control Board
CRC	Convention and the Chemical Review Committee
EIA	Environment Impact Assessment
ELV	End of Life Vehicles
EPA	Environment Protection Agency
ESM	Environmentally Sound Management
EU	European Union
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHS	Globally Harmonized System for Classification and Labelling of Chemicals
GoI	Government of India
GVA	Gross Value Added
HEAL	Health and Environmental Alliance
ICCM	International Conference on Chemicals Management
IGCS	Indo-German Centre for Sustainability
ILO	International Labour Organization
IMCO	Inter-Governmental Maritime Consultative Organisation

IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
IPEN	International POPs Elimination Network
IPM	Integrated Pest Management
IVM	Integrated Vector Management
LDCs	Least Developed Countries
MAH	Major Accident Hazard
MEA	Multilateral Environment Agreements
MoEF&CC	Ministry of Environment, Forests and Climate Change
MTA	Metric Tonnes/Annum
NAFTA	North American Free Trade Agreement
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
OECD	Organisation for Economic Co-operation and Development
PCPIRs	Petroleum, Chemical and Petrochemical Investment Regions
POPs	Persistent Organic Pollutants
SAICM	Strategic Approach to International Chemicals Management
SDGs	Sustainable Development Goals
SLF	Secured Landfills
SPCB	State Pollution Control Board
SPREP	Secretariat of the Pacific Region Environment Programme
TEPA	Trade and Economic Partnership Agreement
TSDFs	Treatment, Storage & Disposal Facilities
UN	United Nations

UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WEEE	Waste of Electronic or Electrical Equipment
WHO	World Health Organisation
3Rs	Reduce, Reuse and Recycle

CHEMICALS AND HAZARDOUS WASTE - OVERVIEW AND DEFINITIONS

1.1 UNDERSTANDING CHEMICAL SUBSTANCES:

The Oxford Dictionary defines a chemical as “a distinct compound or substance, especially one which has been artificially prepared or purified”.¹ Any substance consisting of matter which may be in the form of solids, liquids or gases is a chemical. The most naturally occurring chemical in the gaseous form is oxygen. Minerals such as copper and zinc are chemicals in the solid form that are found naturally. A chemical substance is any material that has a definite chemical composition. The Compendium on Chemical Terminology compiled by A. D. McNaught and A. Wilkinson defines a chemical substance as a “matter of constant composition best characterized by the entities (molecules, formula units, atoms) it is composed of. Physical properties such as density, refractive index, electric conductivity, melting point etc. characterize the chemical substance.”² Like chemicals, chemical substances may take the form of solids, liquids or gases and may change from one form to the other when exposed to changes in temperature or pressure. A chemical substance may be an element such as iron, zinc or gold or a compound made up of elements of more than one chemical such as sucrose or sugar that is made up of the elements carbon, hydrogen and oxygen. Chemical substances may occur naturally, such as water that is the most naturally occurring liquid chemical substance made up of hydrogen and oxygen or be artificially made. Artificial or man-made chemical compounds

-
- 1 The Oxford Learner's Dictionary, Available at: https://www.oxfordlearnersdictionaries.com/definition/english/chemical_1?q=chemical (Last accessed on October 10, 2019).
 - 2 IUPAC. Compendium of Chemical Terminology, 2nd ed. (The “gold book”) Compiled by A. D. McNaught and A. Wilkinson. Blackwell Scientific Publications, Oxford (1997). Online Version (2019-) Created by S. J. Chalk. ISBN 0-9678550-9-8. <https://doi.org/10.1351/goldbook>.

comprising of elements of different chemicals have revolutionized several sectors. Ethyl glycol used as antifreeze, aspirin the famous pain relieving drug, aspartame used as an artificial sweetener and teflon used as coating in non-stick cookware are some of the well-known examples of man-made chemical substances.

In the present times, chemicals have become an indispensable part of our lives. Chemical substances are used to sustain life in several ways and are used in food and household products, agricultural products, pharmaceuticals etc. Humans are exposed to chemicals everyday through multiple routes which include but are not limited to ingestion (eating or swallowing), inhalation, skin contact and via the umbilical cord to the unborn child. It can be clearly stated that not all chemical substances are harmful and a number of them are used by individuals and families across the globe on a daily basis with little or no side-effects, some of which include common salt (sodium chloride), baking powder (sodium bicarbonate), detergent (sodium sulphate), mouthwash (hydrogen peroxide), aspirin (acetyl salicylic acid). However, there are some other chemicals and chemical substances that people get exposed to in their day to day lives that can be highly hazardous and pose negative effects to our health and the environment when improperly managed. Some conventional examples of such chemical substances are *arsenic* that could result in chronic arsenic poisoning that passes on to humans through groundwater containing naturally high levels of inorganic arsenic, food prepared with this water, and food crops irrigated with high arsenic water sources; *formaldehyde*, a carcinogen used in the production of plywood, building insulation, paper napkins, towels and tissues; *mercury* that has different toxic effects on the nervous, digestive and immune systems, lungs, kidneys, skin and eyes and reaches humans through air pollution, industrial waste, consumption of some varieties of fish that accumulate higher concentrations of the chemical; and *lead* that one gets exposed to through lead based paint and lead contaminated dust that can have multiple ill effects including the neurologic, hematologic, gastrointestinal, cardiovascular, and renal system failure, stunted growth and delayed development in children.³ There are several other chemicals that affect the environment and human health in more ways than one.

3 See generally, Ten Chemicals of Major Public Health Concern. World Health Organization, Available at: https://www.who.int/ipcs/features/10chemicals_en.pdf?ua=1. (Last accessed on 16, November 2019).

Data released by the World Health Organization reflects that nearly 1.6 million lives and 45 million disability-adjusted life-years were lost in 2016 due to exposures to selected chemicals. This however, accounts for data available with regard to a relatively small number of chemical exposures, when in fact people are exposed to many more chemicals every day. Approximately 1 million deaths across the globe result from unintentional chemical poisoning, of which 78,000 can be considered preventable.⁴

Besides the adverse effects of chemical substances on human health, the environment and ecosystem may also be deeply impacted through the long-term exposure of certain chemicals or short term exposure of highly lethal and toxic chemicals released into water, air and land. However, it is important to understand that chemical substances usually pose a threat to the environment when it is released in large quantities, is toxic, persists in the ecosystem in one form or the other or is transformed into a more toxic material and targets living organisms whether plants, animals or humans.⁵

Irrespective of the effect that a chemical substance has on the human body, environment or the ecology, whether good or bad it is a given that chemical substances are here to stay, especially if we consider the diverse uses to which they are put starting from domestic, agricultural, medicinal to industrial. Hence, it is important to understand some of the basic properties of chemical substances. Understanding the properties of chemical substances becomes pertinent, since it enables one to identify the nature of the substance and to gauge how the substances could react and behave under different conditions. This brings one to the properties of chemical substances.

1.2 CHEMICAL AND PHYSICAL PROPERTIES OF CHEMICAL SUBSTANCES:

The characteristics that distinguish one substance from another are the physical and chemical properties. The difference between physical and chemical properties of a chemical

4 *See generally*, Public Health Impact of Chemicals: Knowns and Unknowns, World Health Organization, Available at: <https://www.who.int/ipcs/publications/chemicals-public-health-impact/en/> (Last accessed on 16, November 2019).

5 Donald R. Miller, 'Chemicals In The Environment,' In 'Effects of Pollutants At The Ecosystem Level', (John Wiley & Sons Ltd, 1984).

substance is a very basic one. It is easier to witness the physical properties than the chemical ones. The physical properties of a substance are the ones that can be witnessed with the naked eye in the form of colour, smell, freezing point, boiling point, melting point, viscosity, density etc. whereas chemical properties are those properties or behaviour that a chemical substance exhibits when it undergoes a chemical change or reaction, for instance; heat of combustion, reactivity with water and other substances, flammability, stability under specific conditions, toxicity, corrosivity, etc.⁶ While physical properties of a chemical substance in most cases help in the identification of the substance by observation through the naked eye or by measurement and are not associated with change in the chemical composition, there must be a chemical change or reaction for the chemical property of a substance to be observed. Unlike physical properties, a chemical reaction or change must occur for one to observe a chemical property of a chemical substance.⁷ An example of this could be the oxidation of iron to form rust. The fact that iron when exposed to oxygen in the presence of water or moisture in the air turns into rust, is a chemical property of iron, that would not be readily apparent when the physical properties of iron are plainly studied. Since chemical properties of a chemical substance are not obvious, they are included in labels for chemical containers.

Some of the common physical and chemical properties of chemical substances are physical state - which may take the solid, liquid or gaseous form; colour; odor, or the property of a substance that stimulates or is perceived by a sense of smell; vapour pressure; solubility; density; gravity; evaporation rate; specific gravity; decomposition temperature; sensitivity to shock or friction; boiling point; freezing point etc.⁸ These properties help in classification of chemical substances and in managing them. Certain substances (mostly chemical) require special care in their storage, both during and after use. Hence, proper knowledge of care and management of each substance is mandatory so that it is not dangerous for anyone handling these substances.

6 Cavallini S., et al., “*Handbook on Chemical and Biological Waste Management*”, 94 (2014).

7 Anne Marie Helmenstine, Chemical Property-definition and Example, Available at: <https://www.thoughtco.com/definition-of-chemical-property-and-examples-604908>, (Last accessed on 5, October 2019).

8 *Supra* note at 6, at 95-97.

In addition to the general dangers and hazards that chemical substances pose, maintaining safety while dealing with chemicals is not merely dependent on its chemical and physical properties and is inherently linked to other safety issues which include but are not limited to engineering controls, laboratory procedures to which the chemical substances are exposed, personal protective gear and equipment used by persons handling such substances, electrical safety, fire safety; means and methods of hazardous waste disposal. Besides the general physical and chemical properties of chemical substance, another set of properties that deserves a mention are the hazardous properties of chemical substances, especially when the subject being deliberated upon is chemical and waste management. Many chemicals have properties that make them hazardous. For instance, the chemicals may pose physical hazards if they result in fire or explosion, especially when they are highly inflammable, and/or cause health hazards owing to their toxicity or carcinogenic property or result in chemical burns etc. Many such chemical substances are categorized as hazardous chemical waste. It is therefore important to have some understanding about the hazardous properties of chemical substances. It is important to clarify at the outset that there is considerable overlap between chemical and hazardous properties of chemical substances. Most hazardous properties of a chemical substance are their chemical properties as well.

1.3 HAZARDOUS PROPERTIES OF CHEMICAL SUBSTANCES

Hazardous properties, as the name suggests, are those properties which can cause harm to our person or the surroundings. These properties generally come to the fore if the chemical substance possessing such a property is not handled with due care and caution or is exposed to any substance to which it is reactive. For example, exposure to specific chemicals in relatively low concentrations over a period may result in chronic effects. On the other hand, at higher concentrations, the effects may be acute. For some chemicals damage is caused at the point of their contact or as soon as they enter into the body, whereas for other chemicals they need to be transported to different organs of the body before their adverse effects become apparent.⁹

⁹ Phillip Carson and Clive Mumford, *Hazardous Chemicals Handbook*, 94 (2nd ed. Butterworth Heinemann 2012).

In simple words hazardous properties are those properties that help in the assessment of the adverse impact or danger that a substance can pose. The evaluation of the hazardous properties of a chemical substance help in the identification of both physical hazards such as flammability, reactivity or health hazards such as carcinogenicity, toxicity or sensitization etc. It also helps in the determination of environmental hazards that the substance can pose. Besides, assisting in the assessment of their hazardous properties and the impact that these substances have on the health and environment, hazard assessment helps to train employees and persons engaged in the handling of these substances and also in the labelling of these substances for proper identification. Akin to chemical substances, often chemical waste is categorized as 'hazardous' owing to their chemical reactivity, toxicity, explosiveness, corrosiveness, radioactivity or other characteristics, that constitute a risk to human health or the environment.

There are different parameters suggested by different frameworks and directives under different Conventions, international and regional organizations and national legislations and regulations that provide a framework for the classification of chemicals and chemical waste as hazardous. When a chemical or chemical waste exhibits or fulfils one or more parameters or properties it is referred to as hazardous. Of the different parameters and properties, there are four hazardous properties that are usually associated with chemical substances and wastes which have been briefly explained below:

1.3.1 EXPLOSIVITY

Explosivity is the property of an explosive substance which could either be a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.¹⁰ Due to this property, the chemical substances are triggered by heat, shock, friction or other impulses to a rapid chemical reaction, decomposition or combustion which leads to rapid generation of heat and gases with a combined volume

10 Definition of Explosives, International Labour Organisation, Available at: <https://www.ilo.org/legacy/english/protection/safework/ghs/ghsfinal/ghsc1528.pdf>. (Last accessed on October 11, 2019).

much larger than the original substance.¹¹ Two common parameters to judge the explosivity of a substance are defined as Upper Explosive Limit and Lower Explosive Limit.

1.3.2 FLAMMABILITY

The ability of a chemical substance to burn or ignite, causing fire or combustion is known as its flammability. Usually materials are rated as highly flammable, flammable and non-flammable.¹² Flammability of a substance usually refers to its self-sustained combustion or ability to burn. Heat generated when the substance gets oxidised (combine chemically with oxygen) must be adequate to make up for the heat lost or dissipated and to heat up the substance to its ignition temperature. This however, depends upon several factors including the environment in which the substance is placed. For instance some substances are flammable only in fresh air, while other substances burn only when they are in the environment of fresh oxygen. Flammability is measured by certain parameters which include *Lower Flammability Limit* and *Upper Flammability Limit* usually associated with flammability of gases. Lower Flammability Limit or the Lower Explosive Limit refers to the lower limit of fuel concentration below which the gas does not allow self-sustained burning. On the other hand, Upper Flammability Limit refers to the highest concentration of the gas in the air, to the extent that the concentration of air is decreased to such as point where burning again cannot be sustained. For liquids, flammability is measured on the basis of *flash point* or the temperature necessary for the liquid to ignite. It is the lowest temperature at which vapour given off by a liquid pool form an ignitable mixture with air. Another parameter in relation of liquid substances and their flammability is dependent on what is known as the *fire point*. The liquid temperature required to produce sufficient vapour to ensure that the fire that has started is sustained by the heat generated from the flames is termed as the *fire point*.¹³ Auto-ignition temperature is another parameter used

11 Explosives, Ilpi, Available at: <http://www.ilpi.com/msds/ref/explosive.html>, (Last accessed on October 11, 2019).

12 Flammability, Chemsafetypro, Available at: <https://www.chemsafetypro.com/topics/cra/flammability.html> (Last accessed on October 11, 2019).

13 C.J. Fry, 'Flammability', Thermopedia, Available at <http://www.thermopedia.com/content/767/> (Last accessed on October 11, 2019); See also SFPE Handbook of Fire Protection Engineering, National Fire Protection Association Quincy, Massachusetts, (3rd ed. 2002).

to gauge the flammability of chemical substances. As a flammable property it is defined as the lowest temperature at which a gas or vapour spontaneously ignites without the presence of any ignition source. Flammability as a hazardous property is generally dependent on more than one factor such as pressure, temperature, environment, the vessel in which the chemical is being carried etc.¹⁴

1.3.3 TOXICITY

Toxicity can be defined as the property of a substance of being toxic or poisonous. In other words it is the property of a substance to cause injury once it is inside the body of human or animals or both. Some of the primary modes through which toxic chemicals can enter the body is by way of inhalation, ingestion and absorption through the skin. Hazardous chemicals in the form of gases, vapours, mists, dusts, fumes and aerosols are often inhaled or come in contact with the skin and affect the skin, eyes and mucous membranes. Although ingestion is rare, it may be possible to accidentally consume some hazardous chemicals as a result of poor personal hygiene, subconscious hand-to-mouth contact, or accidents. While the skin may not show any immediate effect of contact with a hazardous substance, it provides a route for substances to enter the body owing to its permeable feature.¹⁵ If the effect that a hazardous substance with toxic properties has on the human body is to be judged, it could be categorised under three heads: acute toxicity in which the harmful effects of the hazardous substance on an organism becomes known or apparent after a single or short term exposure; sub-chronic toxicity refers to the ability of the hazardous substance to affect the exposed organism for more than a year but less than its lifetime. Lastly, chronic toxicity arises when harmful effects are caused to the exposed organism over an extended period of time which may extend up to its lifetime; usually due to repeated or continuous exposure of the harmful substance on the organism.¹⁶

14 Ann Marie Fauske, "Flammability Testing: Flash Point Versus Auto-ignition Temperature", Available at: <https://www.fauske.com/blog/do-you-know-your-flash-point-from-your-ait-test-in-flammability-testing> (Last accessed on October 12, 2019).

15 Phillip Carson and Clive Mumford, *Hazardous Chemicals Handbook*, 67(2nd ed. Butterworth Heinemann 2012).

16 National Research Council, *Pesticides in the Diets of Infants and Children*, 127-158 (Washington, Dc: The National Academies, 1993). Available at <https://doi.org/10.17226/2126>. (Last accessed on October 12, 2019).

In so far as the assessment of toxic parameters of hazardous substances are concerned, there are a number of indicators that are usually employed, but the most common are the LD₅₀ and the LC₅₀. Apart from these indicators there are a wide range of techniques for assessment of skin and eye irritation, skin sensitization, mutagenicity, acute and chronic dermal and inhalation toxicity, reproductive toxicology, carcinogenicity, neurotoxicity, endocrine disruptors, genotoxicity etc.¹⁷ LD stands for 'lethal dose' and LD₅₀ is the statistically derived single dosage of a substance that can be expected to cause death in 50% of the sample population of the animal/organism on which it is tested. It therefore indicates acute toxicity or short term poisoning potential of an organism. The affect that a toxic substance would have on an organism is also dependent on the species, sex, age, etc. LC₅₀ also used to measure acute toxicity of chemicals through the air breathed or in water is the 'lethal concentration' of a chemical or chemical substance (e.g. in air or water) that will cause the death of 50% of the sample population of the animals/organisms on which it is tested. Toxic substances are tested on animals and their toxicity rating may range between extremely toxic, highly toxic, moderately toxic, slightly toxic, non-toxic or harmless.¹⁸

While tests to determine toxicity are conducted on animals, primarily rats and mice in general, if the immediate toxicity is similar in all of the different animals tested, the degree of immediate toxicity is likely to be similar for humans. When the LD₅₀ values of a particular toxic substance is different for animal species, approximations and assumptions have to be made to estimate the probable lethal dose of the substance on man. The toxicity of hazardous substances that are gauged on the basis of LD₅₀ and LC₅₀ for humans may range from 1 grain, 1 teaspoon, 1 pint to 1 quart of the substance to form a lethal dose for humans depending upon their weight, age etc. Different chemical substances may affect different organs of the human body, but it is difficult to measure with certainty which of these chemicals are more harmful. Thus, to compare the toxic potency of different chemical or hazardous substances, the lethality test is carried out using these

17 Toxicity Testing Overview, Alttox.org, Available at: <http://alttox.org/mapp/toxicity-testing-overview/> (Last accessed on November 16, 2019).

18 Phillip Carson and Clive Mumford, Hazardous Chemicals Handbook, 81(2nd ed. Butterworth Heinemann 2012).

two parameters since it measures how much of a chemical is needed to cause the same effect or in this case, death of the sample population of animals tested.¹⁹ Other parameters for measuring toxicity includes *TLV or threshold limit value*²⁰ and *OEL or occupational exposure limit, percutaneous absorption* etc.

1.3.4 CORROSIVITY

The property of a hazardous substance or chemical to eat away, erode or corrode is known as its corrosivity. It is derived from the word ‘corrosion’ which literally means wearing away or deterioration of a material or its properties due to chemical or electro-chemical reaction with components of its environment.²¹ It normally occurs when a chemical substance in the gaseous or liquid form chemically attacks an exposed surface and its effect on the surface attacked could be accelerated due to temperature, pressure or the environment in which the substance reacts to the substance attacked.²² A hazardous substance or chemical that exhibits this property has the ability to damage or destroy other substances when they come into contact and can severely attack a number of materials, including organic compounds and metals. In addition to metals and other chemical substances with which a corrosive substance reacts, living tissues can also be greatly affected by the corrosivity of a substance. The effect of corrosive substances on living and non-living substances is quite distinct.²³

The U.S. Occupational Safety and Health Administration (OSHA), a federal government agency of the Department of Labour defines corrosives “...a chemical that produces destruction of skin tissue, namely, visible necrosis through the epidermis and into the dermis, in at least 1 of 3 tested animals after exposure up to a 4-hour duration. Corrosive

19 What is Ld50 And Lc50?, Canadian Centre for Occupational Health and Safety, Available at: <https://www.ccohs.ca/oshanswers/chemicals/Ld50.html> (Last accessed on November 16, 2019).

20 This represents the concentration of a substance in the air to which a person can be exposed or which can be inhaled day after day without causing any adverse health effects.

21 Vivekanand Kain, In S. Bannerjee and A.k. Tyagi, *Functional Materials: Preparation, Processing and Application*, 507 (Elsevier, 2012).

22 Corrosion., Britannica, Available at: <https://www.britannica.com/science/corrosion>. (Last accessed on November 16, 2019).

23 Corrosivity, Corrosionpedia, Available at: <https://www.corrosionpedia.com/definition/339/corrosivity> (Last accessed on November 16, 2019).

reactions are typified by ulcers, bleeding, bloody scabs and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia and scars.....”²⁴ Hazardous substances with corrosive property pose immediate danger to skin, tissues, eyes and other parts of the body. In so far as the effect of corrosives on human tissue is concerned, a distinction can be drawn between non-penetrating corrosive substances that form a protective layer after reacting with the human tissue and limits the extent of damage. Penetrating corrosives on the other hand enter the eyes and skin deeply and require greater efforts for flushing them out. Rust and electrochemical oxidation is forms of corrosion that affect metals.²⁵

Besides the aforementioned properties, there are other properties that a substance or chemical may exhibit to be deemed hazardous such as radioactivity and carcinogenicity. In the present time and age, when the use of chemicals and the consequent release of chemical waste, a sizeable portion of which can be deemed to be hazardous has become indispensable, understanding the properties that make them hazardous and adopting precautions while handling and disposing of them can ensure that minimum damage is caused to the persons handling them and eventually the environment.

1.4 GLOBALLY HARMONIZED SYSTEM FOR CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

Chemical substances by their very nature and physical characteristics often lead to significant hazards in various aspects. Directly or indirectly, they pose a major threat to human health and the environment if not managed or utilised cautiously. In preventing or minimising the dangers arising from chemical substances, it is imperative to classify them on the basis of their chemically reactive nature, identity the kinds of hazards they pose to health and environment. Such classification not only aids in identifying the possible hazards caused by different types of chemicals but also help to undertake necessary preventive measure to reduce such hazards.

24 Health Hazard Criteria (Mandatory), Appendix A to the Hazard Communication Standard, 29 Cfr 1910.1200. Available at: http://www.ilpi.com/msds/osha/1910_1200_app_a.html#a.2.2.1.1. (Last accessed on October 11, 2019).

25 Corrosive, ILPI, Available at: <http://www.ilpi.com/msds/ref/corrosive.html> (Last accessed on October 11, 2019).

The first time when the question of having a system for the classification of chemicals was raised was at the UN Earth Summit in Rio de Janeiro in 1992 and further at the World Summit on Sustainable Development in 2002 in Johannesburg.²⁶ At the Earth Summit in 1992, the International Labour Organization (ILO), the Organisation for Economic Co-operation and Development (OECD), various governments and other stakeholders agreed upon the need of developing a globally harmonized hazard classification and compatible labeling system. The United Nations Organisation adopted the Globally Harmonized System for Classification and Labelling of Chemicals in the wake of the growing international market of chemical mixtures and substances, to facilitate trade and also to save people from the hazards which can be caused by chemicals. Most countries and organizations have developed regulations for the labelling of chemicals that identifies the chemicals and the hazards they pose and the protective measures to be implemented. But the differences in the existing laws and regulations have resulted in differences in labelling for same chemicals that come from different countries. Hence, some chemical that is labelled flammable in one country may not be considered flammable in another country. Acknowledging the extent of international trade in chemicals and the importance of a uniform labelling framework and the need for national rules that ensure safety in the use, transport and disposal of chemicals, it was recognized that an internationally harmonized system of labelling and classifying chemicals would be imperative.²⁷

So, given the gravity of the situation, GHS was recognised as an approach that was harmonized internationally to organise and label chemical substances. Its aim is to ensure that all the information on toxicity and hazards from chemical substances must be made available and accessible so that the protection of both, the health of humans and that of the environment during the management, transport and use of such substances, can be

26 Background: Globally Harmonised System, Health and Safety Executive (UK), Available at: <http://www.hse.gov.uk/chemical-classification/legal/background-directives-ghs.htm> (Last accessed on October 11, 2019).

27 Globally Harmonized System for Classification and Labelling of Chemicals (GHS), Ch.1.1.1.1.2 (8th ed. 2019) Available at: http://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html (Last accessed on November 16, 2019).

done efficiently.²⁸ GHS was adopted in 2002 by the UN and published for the first time in 2003. Since then, it has been revised and enhanced eight times, the latest revision being in the year 2019.²⁹ The scope of GHS includes the following³⁰:

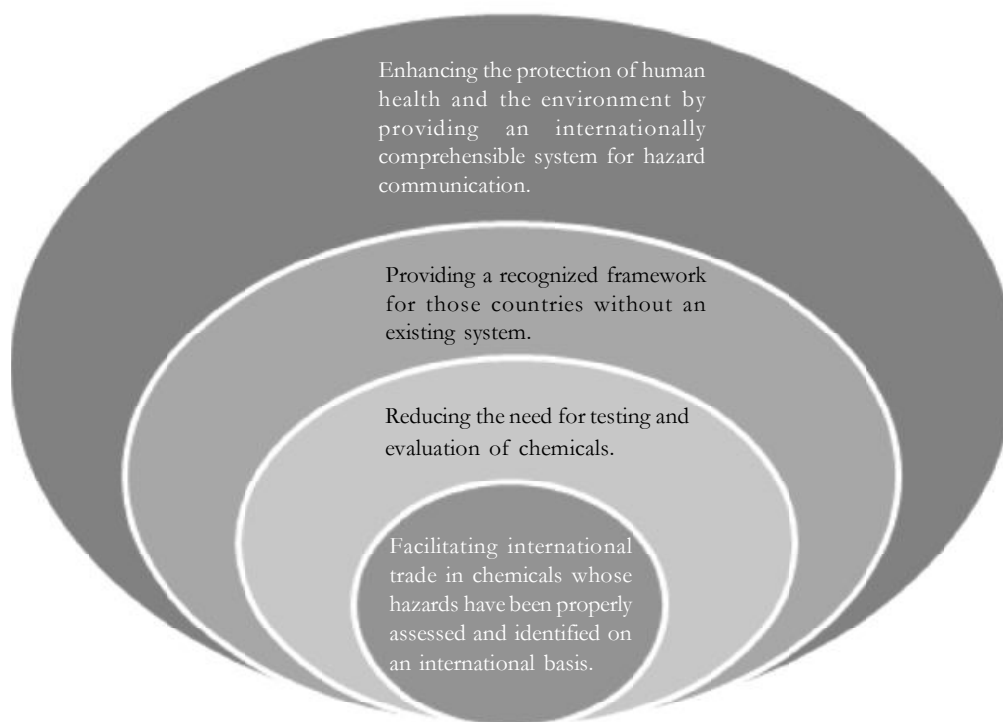
- A harmonized criteria for classifying chemical substances and mixtures according to their health, environmental and physical hazards;
- A harmonized system for the communication of hazard elements;(for instance pictograms and labels; symbol such a flame, gas cylinder etc, signal word such as ‘danger’; ‘warning’; and hazard statement such as “Chemical under pressure: May explode if heated), including requirements for labelling and safety data sheets.

This classification is done by way of types of hazard and is aimed at making available all information on hazards (such as acute toxicity, non-flammable etc.) from chemicals in order to enhance the protection of human health and the environment during the handling, transport and use of these chemicals. Furthermore, the GHS provides a basis for harmonization of rules and regulations on chemicals at national, regional and worldwide level and a systematic compliance framework for industries dealing with chemical substances.³¹

29 Globally Harmonized System for Classification and Labelling of Chemicals (GHS), Ch.1.1.1.1.2 (8th ed. 2019) Available at: http://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html (Last accessed on November 16, 2019).

30 Globally Harmonized System for Classification and Labelling of Chemicals (GHS), Ch.1.1.1.1.2 (8th ed. 2019) Available at: http://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html (Last accessed on November 16, 2019).

31 Cavallini S., et al., “*Handbook on Chemical and Biological Waste Management*”, 100 (2014).



NEED FOR HARMONISED SYSTEM OF LABELLING AS PER GHS

The GHS also mandates guidance for the preparation of safety data sheets. An SDS is a detailed and all-inclusive report containing information about a substance for use in regulatory framework. It is used by both workers and employers as a source of information about hazards, including the environmental ones, and also provides data on safety precautions.³² Besides the GHS, the International Hazard Communication Standard (HCS) requires chemical manufacturers to communicate a chemical's hazard information to chemical handlers by providing a Safety Data Sheet. All information required such as chemical properties, health and environmental hazards, protective measures, as well as safety precautions for storing, handling, and transporting chemicals are reflected in Safety Data Sheets.³³ The GHS Eight Revised edition is divided into four parts; each part

32 Globally Harmonized System for Classification and Labelling of Chemicals (GHS), Ch.1.1.1.1.2 (8th ed. 2019) Available at: http://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html (Last accessed on November 16, 2019).

33 Safety Data Sheet, Chemical Safety, Available at: <https://chemicalsafety.com/sds-search/> (Last accessed on November 16, 2019).

corresponding to a particular kind of hazard - physical, health and environmental and 11 Annexes.

Chemical substances and mixtures fall under three heads: Hazard Group; Hazard Class and Hazard Category. The different types of hazards comprised within a hazard group are called hazard class. For instance gases under pressure and self-reactive substances and mixtures fall under the 'physical' hazard group. The sub-categories under a hazard class are termed as hazard categories. For instance flammable liquids a hazard class under the Physical Hazard group are classified into 4 categories based on their flash point and initial boiling point.

Each Hazard Category has rules or criteria to determine what chemicals are assigned to that category. Each Category has numbers (or letters) with category 1 (or A) being the most hazardous. Taking the example of the Group Health Hazard; carcinogenicity would be a Hazard Class and Carcinogenicity 1A would be a Hazard category.

Many questions may arise as to the applicability of GHS. In this regard certain parameters have been set. GHS covers all chemicals that are hazardous and its target audiences include consumers, workers, transport workers and emergency responders. However, hazard communication elements of the GHS such as labels and safety data sheets vary according to the product category or stage in the life cycle.³⁴ Apart from containing a harmonized classification criteria for chemicals labelling norms, the GHS document also provides assistance and guidance to countries and organizations in developing tools for implementation of the GHS. The GHS is designed in a way to allow self-classification and the uniform development of national policies on classification of chemicals. It also provides flexibility to accommodate any special requirements that a nation may have to meet.³⁵


34 Globally Harmonized System for Classification and Labelling of Chemicals (GHS), Ch.1.1.1.1.2 (8th ed. 2019) Available at: http://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html (Last accessed on November 16, 2019).

35 *Ibid*, Ch. 1.1.4.

To put it succinctly, it can be said that GHS aims to deliver certain benefits such as facilitating trade, promoting efficiency in regulation, and the most important issues of safe handling, transport and use of chemicals. GHS provides harmonized criteria for classifying chemical substances and mixtures according to their health, environmental and physical hazards. The following section deals with each of these categories and the chemical substances that are enlisted under each of the three heads.





1.4.1 PHYSICAL HAZARDS







In terms of the physical hazards, the chemical substances have been categorised by the GHS as follows³⁶:







HAZARD CLASS	NO. OF CATEGORIES	GHS SYMBOL
Explosives: An explosive substance (or mixture) has been defined as a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases. Pyrotechnic substance (or mixture) has been defined as a substance or mixture designed to produce an effect by light, sound, gas, smoke or a combination of these as a result of non-detonating, self-sustaining exothermic chemical reactions. All explosive substance, mixture or article ³⁷ other than unstable explosives are assigned one out of six divisions depending on the type of hazard they present which could range from mass explosion, a fire hazard or a minor blast etc.	Unstable Explosives – 1 Explosives Division 1.1-1.6	



³⁶ *Ibid*, Part 2.

³⁷ An explosive article is an article containing one or more explosive substances.

<p>Flammable gases: A gas having a flammable range with air at 20 °C and a standard pressure of 101.3 kPa. They are differentiated from pyrophoric gases and chemically unstable gases. A pyrophoric gas is a flammable gas that is liable to ignite spontaneously in air at a temperature of 54 degree Celsius or below. Whereas, a chemically unstable gas is a flammable gas that is able to react explosively even in the absence of air or oxygen.</p>	<p>Three categories - 1A, 1B and 2</p>	
<p>Aerosols: Aerosols are non-refillable receptacle made of metal, glass or plastics and containing gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or a gaseous state. However, they do not include gases under pressure. Aerosols should be considered for classification as flammable if they contain any component which is classified as flammable according to the GHS criteria, i.e., flammable liquids; flammable gases and flammable solids.</p>	<p>Three categories: 1, 2 and 3</p>	
<p>Oxidising Gases: An oxidising gas is classified under a single category, and is any gas which may, generally by providing oxygen contribute to the combustion of other material more than air.</p>	<p>One Category</p>	
<p>Gases under pressure: Gases which are contained in a receptacle at a pressure not less than 200 kPa at 20 °C or as a refrigerated liquid. They comprise of, depending on their physical state when packaged.</p>	<p>Four Categories: Compressed gases, Liquefied gases, Dissolved gases and Refrigerated liquefied gases.</p>	


Flammable liquids: Flammable liquid is a liquid having a flash point of not more than 93°C. Flammable liquids are classified into 4 categories based on their flash point and initial boiling point.	Four categories: 1, 2, 3 and 4 based on flash point and initial boiling point.	
Flammable solids are solids which are readily combustible, or may cause or contribute to fire through friction. Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. They are put under two categories.	Two categories: 1 and 2 based on burning rate test and burning time	
Self-reactive substances and mixtures: These include thermally unstable liquid or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes substances and mixtures classified under the GHS as explosives, organic peroxides or as oxidizing. A self-reactive substance or mixture is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show violent effect when heated under confinement.	Seven categories: Types A – G divided on the basis of principles under Chapter 2.8	
		
Pyrophoric liquids are liquids which, even in small quantities, can ignite within five minutes after coming into contact with air.	One Category	
Pyrophoric solids are solids that even in small quantities, can ignite within five minutes after coming into contact with air.	One Category	

<p>Self-heating substances and mixtures: A self-heating substance or mixture is a solid or liquid substance or mixture, other than a pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat. It differs from a pyrophoric liquid or solid in that it will ignite only when in large amounts (kilograms) and after long periods of time (hours or days).</p>	<p>Two Categories: 1 and 2 classified in accordance with test N.4 under GHS</p>	
<p>Substances and mixtures which, in contact with water, emit flammable gases are substances or mixtures which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.</p>	<p>Three Categories: 1, 2 and 3 classified in accordance with test N.5 under GHS</p>	
<p>Oxidizing liquid: A liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.</p>	<p>Three Categories: 1, 2 and 3 classified in accordance with test O.2 under GHS</p>	
<p>Oxidizing solids: A solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.</p>	<p>Three Categories: 1, 2 and 3 classified in accordance with test O.1 and O.3 under GHS</p>	
<p>Organic peroxides: Liquid or solid organic substances which contain the bivalent -O-O structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides are thermally unstable substances or mixtures, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: (a) be liable to explosive</p>	<p>Seven categories: Types A – G divided on the basis of principles under Chapter 2.15</p>	
		







decomposition; (b) burn rapidly; (c) be sensitive to impact or friction; (d) react dangerously with other substances.		
Corrosive to metals: A substance or a mixture that is corrosive to metal is a substance or a mixture which by chemical action will materially damage, or even destroy, metals.	One Category	
Desensitized Explosive: They are solid or liquid explosive substances or mixtures which are rendered less sensitive to suppress their explosive properties in such a manner that they do not mass explode or do not burn too rapidly and therefore are exempted from the hazard class of 'explosives'.	Four categories: 1, 2, 3 and 4 based on 'burning rate test'	






1.4.2 HEALTH HAZARDS



In terms of the health hazards, the chemical substances have been categorised by the GHS as follows:³⁸

HAZARD CLASS	NO. OF CATEGORIES	GHS SYMBOL
Acute Toxicity: Acute toxicity refers to serious adverse effects or lethality after oral, dermal or inhalation (of gases, vapours, dusts or mist) exposure of a substance or mixture. Measured on the basis of Acute Toxicity Estimates or LD ₅₀ (oral/dermal) and LC ₅₀ (inhalation).	Five categories : 1,2,3,4 and 5	

³⁸ Ibid, Part 3.

<p>Skin corrosion/irritation - Skin Corrosion is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to 4 hours. Skin Irritation is the production of reversible damage to the skin following the application of a test substance for up to 4 hours.</p>	<p>Three categories: Category 1 further sub-divided into categories 1A, 1B and 1C to be used by authorities requiring more than one category; Category 2 (skin irritation) and Category 3 (mild skin irritation).</p>	 
<p>Serious Eye Damage and Irritation – Serious eye damage is the production of tissue damage in the eye, or serious physical decay of vision, not fully reversible that occurs after exposure of the eye to any substance or mixture. Eye irritation is the production of changes in the eye, occurring after exposure to any substance or mixture which is fully reversible.</p>	<p>Two categories: category 1 (serious eye damage) and category 2 (eye irritation)</p>	 
<p>Respiratory or skin sensitization- A respiratory sensitizer is a substance that will induce hypersensitivity of the airways following inhalation of the substance. A skin sensitizer is a substance that will induce an allergic response following skin contact.</p>	<p>Two categories: Category 1 (Respiratory sensitizers) -may be further sub-divided into 1A and 1B and Category 2 (Skin sensitizers) – may be further sub-divided into 2A and 2B</p>	 



<p>Germ cell mutagenicity- Chemicals the exposure to which may cause mutations in the germ cells of humans that can be transmitted to the progeny, including chromosome aberrations.</p>	<p>Two categories</p>	
<p>Carcinogenicity - A chemical substance or a mixture of chemical substances which induce cancer or increase its incidence. Substances which have induced benign and malignant tumours in well performed experimental studies on animals are considered also to be presumed or suspected human carcinogens unless there is strong evidence that the mechanism of tumour formation is not relevant for humans.</p>	<p>Two categories: Category 1 (known or presumed human carcinogens further sub-divided into categories 1A and 1B) and category 2 (suspected human carcinogens)</p>	
<p>Reproductive toxicity refers to adverse effects on sexual function and fertility in adults and; developmental toxicity in the offspring after exposure to a substance or mixture.</p>	<p>Two categories: Category 1 (known or presumed human reproductive toxicant further sub-divided into categories 1A and 1B) and category 2 (suspected human reproductive toxicant)</p>	
<p>Specific target organ systemic toxicity - single exposure refers to specific, non-lethal toxic effects on target organs occurring after a single exposure to a substance or mixture.</p>	<p>Three categories: category 1 (presumed to produce significant toxicity in humans; category 2 (presumed to be harmful to human health) and category 3 (transient target organ effects)</p>	
		

<p>Specific target organ systemic toxicity - repeated exposure refers to specific, non-lethal toxic effects on target organs occurring after repeated exposure to a substance or mixture.</p>	<p>Two categories: category 1 (presumed to produce significant toxicity in humans) and category 2 (presumed to be harmful to human health)</p>	
<p>Aspiration hazard - refers to severe acute effects such as chemical pneumonia, varying degrees of pulmonary injury or death following aspiration of a substance or mixture.</p>	<p>Two categories: category 1 (chemicals known to cause human aspiration toxicity hazard) and category 2 (chemicals presumed to cause human aspiration toxicity hazard)</p>	

1.4.3 ENVIRONMENT HAZARDS

In addition to physical and health hazards, the GHS identifies certain properties exhibited by chemical substances that are hazardous to the environment. Under environmental hazards, chemical substances and mixtures have been categorised under different heads depending upon the part of the environment that they effect such as the aquatic environment, the ozone layer. Under environment hazards, the chemical substances have been categorised by the GHS as follows³⁹

³⁹ *Ibid*, Ch. 4.

HAZARD CLASS	NO. OF CATEGORIES	GHS SYMBOL
Hazardous to the Aquatic Environment		
<p>Acute aquatic toxicity is the intrinsic property of a substance to be injurious to an organism in a short-term exposure to that substance.</p> <p>Chronic aquatic toxicity - potential or actual properties of a substance to cause adverse effects to aquatic organisms during exposures which are determined in relation to the life-cycle of the organism.</p>	Short term (acute) hazard are out under three categories: Acute 1, Acute 2 and Acute 3. Long term (chronic) hazard are further classified based on the availability of adequate toxicity data.	
Hazardous to the Ozone Layer		
Ozone Depleting Potential is an integrative quantity, distinct for each halocarbon source species, that represents the extent of ozone depletion in the stratosphere expected from the halocarbon on a mass-for-mass relative to CFC-11.	One Category based on the Montreal Protocol.	

An overview of this hazard classification reflects that it is necessary to categorize chemical substances in order to understand the dangers that may emanate from them. At this juncture it is noteworthy that the regime in India does not imbibe this classification by the UNECE in toto. However, there have been positive actions to adopt this pattern of categorizing chemical substances. In July 2011, the Ministry of Environment and Forests published a draft document called Hazardous Substances (Classification, Packaging and Labelling) Rules, 2011.⁴⁰ Though these rules have not been officially adopted, they are in tandem with the UN GHS. Furthermore, in May 2017, the Ministry of Environment, Forest, and Climate Change formed the National Coordination Committee to prepare a

⁴⁰ GHS India SDs Requirement, Chemsafetypro, Available at: https://www.chemsafetypro.com/topics/india/ghs_india_sds_requirements.html (Last accessed on November 16, 2019).

National Action Plan for Chemicals for India. This National Action Plan is said to be a positive step in revising the existing legislations and tuning them in line of the GHS. While India is yet to adopt the GHS for classification of chemicals, India has certain Safety Data Sheet requirements enlisted under Schedule 9 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 which to a great extent is compliant with the GHS safety data sheet.

INTERVENTIONS OF INTERNATIONAL ORGANISATIONS IN THE FIELD OF CHEMICAL AND HAZARDOUS WASTE MANAGEMENT

2.1 INTRODUCTION

Hazardous waste and its proper management has been a major concern the world over because of its wide ramifications. Hazardous waste not only causes grievous harm to the environment, wildlife and human health, both immediate and long term, but it is also lethal to all living things. The impact of hazardous waste transcends boundaries and generations and while the immediate or first point of contact and impact may be the environment or human and animal health, in the long run it has the potential of disrupting communities, affecting populations placed close to sites of disposal or spillage and devaluing property, thereby exhibiting social and economic effects.¹

Hazardous waste has increased substantially over the years which further necessitate strong systems and mechanism for their proper handling and disposal. Hazardous waste definitions differ from one country to another. A generic definition might depend on wastes or combinations of wastes that pose a substantial present or potential future threat to the environment or human life. There are a multiplicity of reasons, that makes hazardous waste unsafe. They are not readily degradable, they are pertinacious in the environment and their effects can be felt over a long period of time, they are detrimental to human and animal health and natural resources. Hazardous waste can arise from various sources which range from industrial manufacturing process wastes to batteries²,

1 Michael R. Greenberg, Richard F. Anderson, and Kirk Rosenberger, *Social and Economic Effects of Hazardous Waste Management Sites*, Hazardous Waste, Vol.1, No.3. Available at: <https://www.liebertpub.com/doi/abs/10.1089/hzw.1984.1.387>. (Last accessed on November 16, 2019).

2 Basics of Hazardous Waste, United Nations Environmental Protection Agency, Available at: <https://www.epa.gov/hw/learn-basics-hazardous-waste> (Last accessed on November 16, 2019).

agricultural land and agro-industries, domestic, mines and mineral processing sites, healthcare facilities, industrial waste sources, institutional waste sources, commercial waste, solid waste disposal sites, contaminated sites, building materials, etc. Hazardous wastes may also emerge from waste oil and fuel; solvents and thinners; acids and bases/alkaline; toxic or flammable paint wastes; chlorinated solvents, heavy metals, peroxides; abandoned or used pesticides; and wastewater treatment sludge.³

Due to the wide range of harmful effects that hazardous waste poses, over many years, different international and regional organizations across the globe have taken initiatives to set up frameworks for the proper management, handling and disposal of such waste. Right from 1865 when the first international intergovernmental organization – the International Telecommunication Union was founded, international organizations have aided in the setting up of international agendas to counter the problems plaguing the world, in steering the attention of the member states to the issues that needed immediate attention, in providing a platform for inter-state deliberation, coordination and cooperation. Thus, international organizations have always played a pivotal role in addressing the social, political, cultural and economic issues, and addressing environmental issues are no exception. While some international organizations have been set up with the sole objective of safeguarding the interests of the environment, there are others that take up the cause of environment in addition to their central mandate. Even in the sphere of Chemical and Hazardous Waste Management, numerous international organisations and their agencies have contributed to the widespread awareness of handling and disposal of chemical and hazardous wastes.

The following section briefly discusses some of the interventions made by organizations and institutions set up in the international and regional level in the field of chemical and hazardous waste management.

3 D. Grasso, D. Kahn, M. E. Kaseva, and S. E. Mbuligwe, *Hazardous Waste Management – Hazardous Waste*. Available at: <http://www.eolss.net/ebooks/sample%20chapters/C09/E1-08-00-00.pdf> (Last accessed on November 16, 2019).

2.2 ORGANIZATIONS WORKING IN THE FIELD OF CHEMICALS AND HAZARDOUS WASTE MANAGEMENT AT THE INTERNATIONAL LEVEL

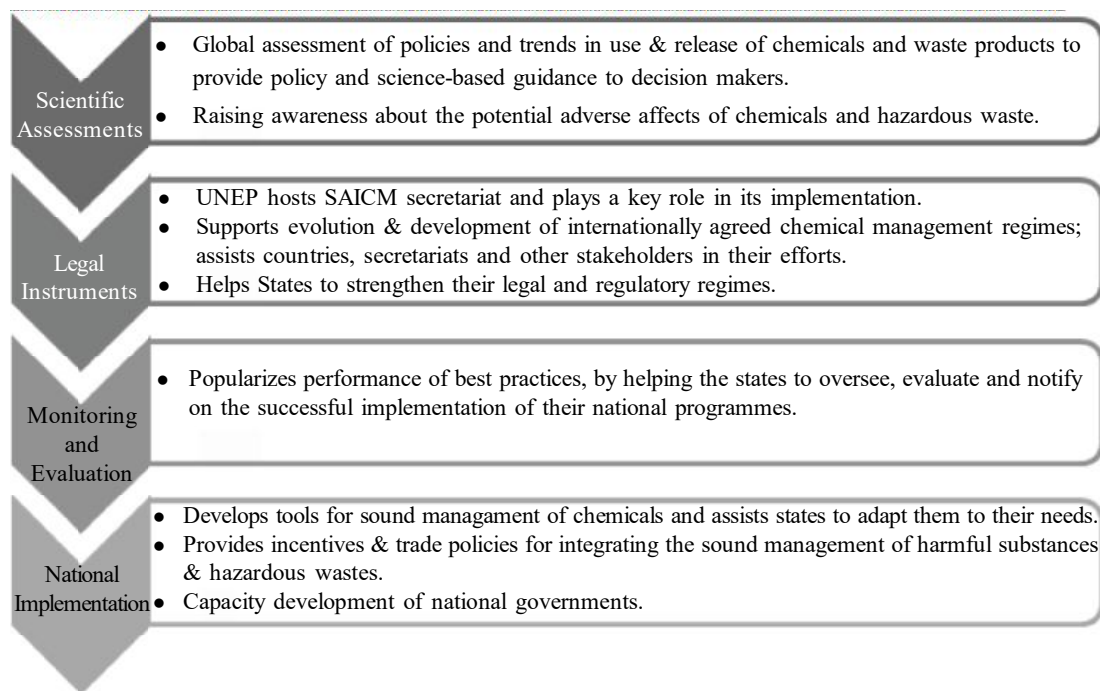
2.2.1 UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

The United Nations Environment Programme is one of the leading international organizations working in the realm of environment protection. UNEP is vested with the duty of coordinating the environmental activities of the United Nations and in assisting the State actors in the implementation of sustainable policies and practices that benefit the environment. It provides guidance to its member states to help them effectuate environmentally safe and sound policies. UNEP headquartered at Nairobi, Kenya, carries an operation of facilitating leadership and invigorating nations of the world to enter into partnerships, thereby engaging them towards protection and care of the environment. Founded in June 1972, as a result of the United Nations Conference on the Human Environment (Stockholm Conference), UNEP has the overall responsibility and accountability for environmental problems among the United Nations agencies.⁴

UNEP categorizes its work into seven broad thematic areas: climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and wastes, resource efficiency and environment under review. With regard to management of hazardous waste, UNEP came up with a unique sub-programme called the *Harmful Substances and Hazardous Waste*. In order to control the use of chemical substances and wastes that have the potential to pose threat to the environment and human health, UNEP intends to support countries and regions in managing the life cycles of such substances. It puts special efforts to minimize the risks from substances like mercury, heavy metals, pesticides, persistent organic pollutants (POPs) and other chemicals of global interest. This sub-programme is built on more than 30 years of work in the field and is a driving force behind the sound management of chemicals and hazardous waste. UNEP's Harmful Substances and Hazardous Waste sub-programme has four key goals⁵:

4 UN Environment, Available at: <https://www.unenvironment.org/about-un-environment> (Last accessed on November 16, 2019).

5 Harmful Substances and Hazardous Waste, United Nations Environment Programme, Available at: <http://wedocs.unep.org/handle/20.500.11822/7939> (Last accessed on November 16, 2019).



UNEP undertakes efforts to reduce risks from harmful substances including Mercury, Persistent Organic Pollutants (POPs), E-wastes, Bio-Medical wastes, Carcinogens or Mutagens, and other chemicals and hazardous wastes. The UNEP under its aegis initiated the signing of several international treaties on waste and hazardous waste including chemical waste and hosts the Secretariats of Basel Convention, Rotterdam Convention, Stockholm Convention and Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.

One of the major ongoing activities at UNEP is the ***Chemicals in Products (CiP) Programme*** initiated in 2008. It is based on the realistic features of information access about the chemical content in everyday products. In order to facilitate the manufacturers to properly handle the products and the chemical content in them, the activities of the programme aim at expanding the availability and access to the information actors need, throughout the whole process of creating a product. The SAICM administrative body

welcomed the CiP Programme in 2015 at ICCM4, which was a result of broad research and stakeholder consultations, as the mechanism for all stakeholders to proceed on this compound issue.⁶

The UNEP has formed a voluntary partnership with World Health Organisation for the purpose of preventing exposure to lead, which is known as ***the Global Alliance to Eliminate Lead Paint***. It mainly aims at popularizing the termination of paints containing lead, to prevent exposure to lead, and promoting the phase-out of paints containing lead. An advisory group guides the Lead Paint Alliance, which is chaired by the United States of America through the Environmental Protection Agency (US EPA). It comprises of Government representatives from Colombia, Republic of Moldova, Kenya, Thailand, IPEN International POPs Elimination Network (IPEN), Health and Environmental Alliance (HEAL), International Paint and Print Ink Council (IPPIC), Akzo Nobel (a paint company), United Nations Industrial Development Organization (UNIDO).⁷

For the purpose of advocating sound management of pesticides, including Integrated Vector Management (IVM) and Integrated Pest Management (IPM), the UN Environment Chemicals and Health Branch indulges in partnerships and collaborations with various organisations at international level, regional level, intergovernmental organisations and Multilateral Environment Agreements (MEA) Secretariats. As covered under the Stockholm Convention, both IPM and IVM are suggested in the elimination of persistent organic pollutant (POP) pesticides. IPM and IVM approaches urge using pesticides as last resort building on several control options. Well within the mandate of Strategic Approach to International Chemicals Management (SAICM), the UN Chemicals and Health Branch intensively popularizes sound management of chemicals. Due to SAICM the overall progress has substantially expedited and coordination with other agencies has

6 Chemicals in Products, United Nations Environment Programme, Available at: <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/emerging-issues/chemicals-products> (Last accessed on November 16, 2019).

7 Global Alliance to Eliminate Lead Paint, United Nations Environment Programme, Available at: <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/emerging-issues/global-alliance-eliminate-lead-paint> (Last accessed on November 16, 2019).

intensified. The international community has probably progressed most in the area of pesticides.⁸

Sustainable chemistry as a concept has attained recognition at an international level. At the fourth session of United Nations Environment Assembly (UNEA) in 2019, resolution 4/8 gave attention to the value of creating a better understanding of sustainable chemistry. The resolution laid emphasis on the analysis given by UNEP on ideal practices in sustainable chemistry and requested the UNEP to amalgamate it into manuals on sustainable green chemistry. It urged consultation with relevant stakeholders, by the time the fifth UNEA is held. Further, the resolution asked the UNEP to take into consideration both the gravity of sustainable management of chemicals as well as the possible boons arising from these chemicals for sustainable development, and thereby asked it to continue to work on developing a holistic approach for the sustainable management of chemicals and wastes in the long run. A report has been made accessible as information document for UNEA4. It is entitled “Analysis of Stakeholder Submissions on Sustainable Chemistry Pursuant to UNEA Resolution 2/7” which requires stakeholders to look at sustainable chemistry as an essential component so that the sound management of chemicals and waste is attained.⁹

2.2.2 ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)

The Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 36 member countries¹⁰, headquartered in Paris, France. It was founded in 1961 to stimulate economic development and world trade. OECD has

8 Pesticides, United Nations Environment Programme, Available at: <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/emerging-issues/pesticides> (Last accessed on November 16, 2019).

9 Sustainable Chemistry, United Nations Environment Programme, Available at: <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/sustainable-chemistry> (Last accessed on November 16, 2019).

10 The Member Countries of OECD are Australia, Austria, Belgium, Canada, Chile Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

also taken some specific actions for management of hazardous waste. On 9 June 2004, the OECD Council brought in force a ***Recommendation on the Environmentally Sound Management of Waste***. Initially, there were problems faced and certain drawbacks in the Environmentally Sound Management of Waste were identified, which were as follows:

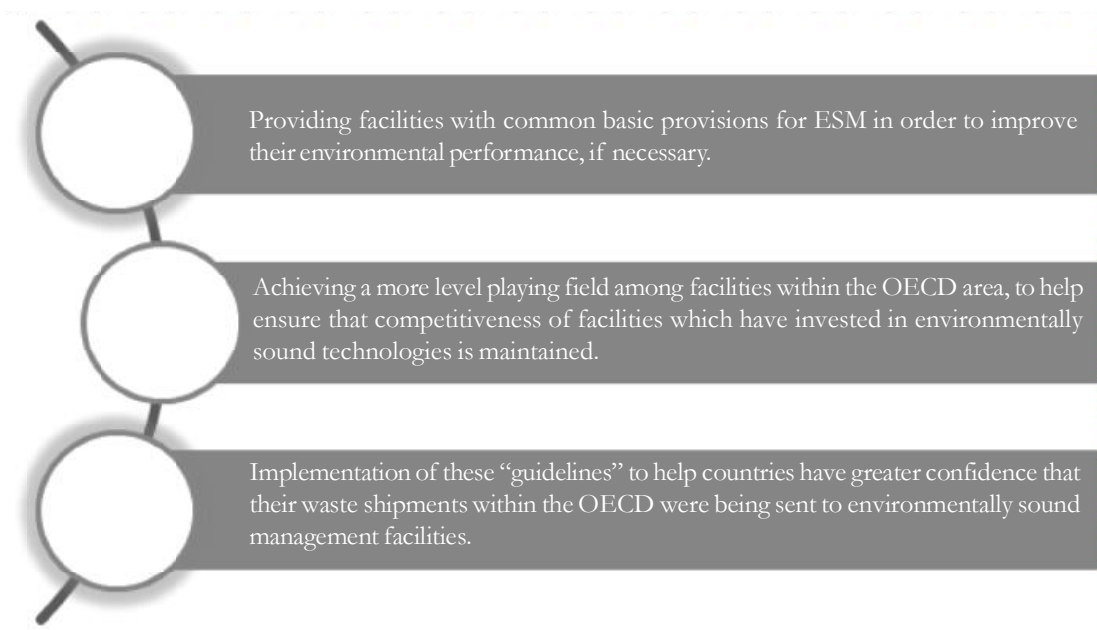
- The level and purview of ESM substantially varies from one member state to another.
- There is absence of a standard and clear definition and unanimous understanding of the term ESM, which has evidently led to obstacles and challenges for the functional and practical implementation of ESM instruments.
- In certain member nations, there are less binding and less forceful environmental controls, human health standards and safety levels observed.
- There is an opportunity created for exporters, importers or waste managers to redirect shipments of wastes, which were intended for recovery, into OECD countries. Furthermore, waste management facilities have lowered waste management standards.¹¹

For the above mentioned reasons, the member states initiated their work towards international ESM Guidelines for waste recovery facilities, in 1999. The aspects that were ventured into by member countries were:

- Considering relevant experience on ESM in OECD and non-OECD countries
- Elucidating the elements of ESM
- Deliberating and discussing voluntary and regulatory approaches to ESM
- Providing guidance to the future OECD work on ESM

11 Environmentally Sound Management of Waste, OECD, Available at: [https://www.oecd.org/env/waste/environmentallysoundmanagementofwaste.htm#targettext=environmentally%20sound%20management%20\(esm\)%20of,principles%20of%20waste%20management%20policies](https://www.oecd.org/env/waste/environmentallysoundmanagementofwaste.htm#targettext=environmentally%20sound%20management%20(esm)%20of,principles%20of%20waste%20management%20policies). (Last accessed on November 16, 2019).

After considering the aforesaid points, the solutions devised included the following¹²:



2.2.3 GLOBAL ENVIRONMENT FACILITY (GEF)

The Global Environment Facility was established on the eve of 1992 Rio Earth Summit, with the aim to handle Earth’s most pressing environmental issues. Today, the GEF is an international partnership of 183 countries, civil society organisations, international institutions and private sector organisations that looks into global environmental problems with its headquarters in Washington D.C. The GEF has facilitated numerous notable achievements in the field of environment protection, some of which include setting up of protected areas, sustainable landscape and seascape aimed towards the protection of biodiversity, sustainable forest and land management, integrated water resource management, among others.¹³ In the field of hazardous waste management, the GEF has

¹² *Ibid.*

¹³ The Sixth Environment Action Programme of the European Community, European Union, Available at: <https://ec.europa.eu/environment/archives/action-programme/intro.htm#targettext=the%206th%20cap%20is%20a,be%20taken%20to%20achieve%20them.&targettext=environment%20and%20health,natural%20resources%20and%20waste%20> (Last accessed on November 16, 2019).

engaged itself in the safe disposal of hazardous chemicals. The efforts in this area have resulted in the phase out of 29,000 ODP (Ozone Depleting Potential) and have led to the sound disposal of more than 200,000 tonnes of POPs legacy in developing countries.¹⁴

Certain harmful chemicals are covered by the Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury, and the Montreal Protocol on Substances that deplete the Ozone Layer. The GEF has been given the responsibility of shutting out these harmful chemicals. By way of providing assistance and support to the Strategic Approach to International Chemicals Management (SAICM), the structure set up by the United Nations to propagate chemical safety around the world, the GEF fuels the accomplishment of broader safe and sound management of chemicals and wastes.

The Global Environment Facility promotes two key strategic goals, which are as follows¹⁵:



¹⁴ Global Environment Facility, Available at: <https://www.thegef.org/about-us> (Last accessed on November 16, 2019).

¹⁵ *Ibid.*

Implementation assistance is provided by GEF to the Parties of the aforementioned Conventions to ensure that the Parties are able to fulfil their commitments under the Conventions. In order to use and manufacture chemicals without suffering their dangerous impacts, the Parties are allowed to use the entry point of these Conventions to reconstruct their management of chemicals accordingly. The work of GEF on harmful chemicals and wastes management emphasizes on four eminent programs in GEF-7 (seventh replenishment of resources of the GEF Trust Fund), which are as follows:



- **The Industrial Chemicals Program:** This program aims to freeze out or substantially minimize chemicals that fall under the international conventions by advancing support to programs that address the following: chemicals and the waste generated at the end of the life of the chemical; chemicals used in processes or emitted as a result of processes and products, and management of wastes containing these chemicals.
- **The Agricultural Chemicals Program:** It is responsible for looking into the agricultural chemicals that are listed under the Stockholm Convention as persistent organic pollutants, as well as those agricultural chemicals that contain mercury or its compounds. In conditions where the use of such chemicals becomes inevitable and necessary, the GEF puts in efforts to bring forth alternatives.
- **The Least Developed Countries and Small Islands Developing States Program:** By way of uplifting the capacity of sub-national, national, and regional institutions and by empowering the enabling policy and structure of rules and regulations in these countries, the GEF addresses the issue of sound management of chemicals and wastes.
- **The Enabling Activities Program:** Under Stockholm Convention and Minamata Convention, it empowers the enabling activities. It also renders assistance to the global monitoring of chemicals.¹⁶

For the replenishment of GEF-7, in order to rid the world of the most harmful chemicals through GEF's chemical and waste program, the donors pledged US\$600 million approximately, which accounted for 15% of the total replenishment commitment. Right from its adoption in 2001, the GEF has cumulatively invested US\$1.2 billion in those projects which support the Stockholm Convention, as of June 30, 2018. Due to this GEF investment, approximately US\$4.8 billion has been leveraged in co-financing, and the cumulative value of GEF POPs portfolio has been brought up to over US \$6 billion.¹⁷

¹⁶ *Ibid.*

¹⁷ Results, Global Environment Facility, Available at: <https://www.thegef.org/topics/chemicals-and-waste> (Last accessed on November 16, 2019).

2.2.4 INTERNATIONAL MARITIME ORGANIZATION (IMO)

The International Maritime Organization earlier known as the Inter-Governmental Maritime Consultative Organisation (IMCO) is the United Nations specialized agency which is responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. IMO's work supports the UN Sustainable Development Goals. The IMO was established following an agreement at a UN Conference held in 1948 at Geneva. It came into existence in 1959, ten years later. Headquartered in London, United Kingdom, the IMO currently has 174 member states and three associate members.¹⁸

Being a specialized agency of the United Nations, IMO has the authority to set global standards and rules for the security, safety and favourable environmental performance in the process of international shipping. Its main objective is to create a structure of rules and regulations that is effective, fair, just, universally adopted and implemented. In simple words, the IMO brings forth a level playing-field, ensuring fair treatment, so that ship operators do not get an opportunity to fulfil their financial needs by way of malpractices, cutting corners and compromising on safety, security and environmental performance. Through this innovation and efficiency is encouraged.¹⁹

The International Maritime Organization (IMO) has the responsibility of maintaining and updating the International Maritime Dangerous Goods Code (IMDG Code). It administers the wide majority of shipments of hazardous materials by water. The intention of IMDG Code is to facilitate the safe transportation of hazardous materials by vessel, to protect crew members and to prevent marine pollution. Essentially the code finds its basis in the UN Model Regulations, but certain items which are found to be necessary for the safe and sound transportation of hazardous materials by water have been included in the code though they do not come under the UN Model Regulations, like: requirements for the shipboard safety and protection of the marine environment, stowage and

18 Introduction to IMO, International Maritime Organization, Available at: <http://www.imo.org/en/about/pages/default.aspx> (Last accessed on November 16, 2019).

19 *Ibid.*

segregation, procedure for loading freight containers, requirements for marine pollutants, etc.²⁰

IMO's Carriage of Cargoes and Containers (CCC) Sub-Committee is responsible for maintaining and updating the IMDG Code. It was earlier known as Dangerous Goods, Solid Cargoes and Containers Sub-Committee. The International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL) bring an obligation upon IMO for the implementation of the IMDG Code. Today, more than 98% of the world's gross tonnage, coming from the combined merchants fleets of at least 150 countries, makes use of the IMDG Code for the purpose of maintaining favourable sea transport of hazardous materials. The IMO updates the IMDG Code every two years. Amendment 38 was effective from January 1, 2018. A twelve month transitional period has been suggested by the IMO's Marine Safety Committee, in order to help the users to become familiar with the new updated format.²¹

2.2.5 INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS (IOMC)

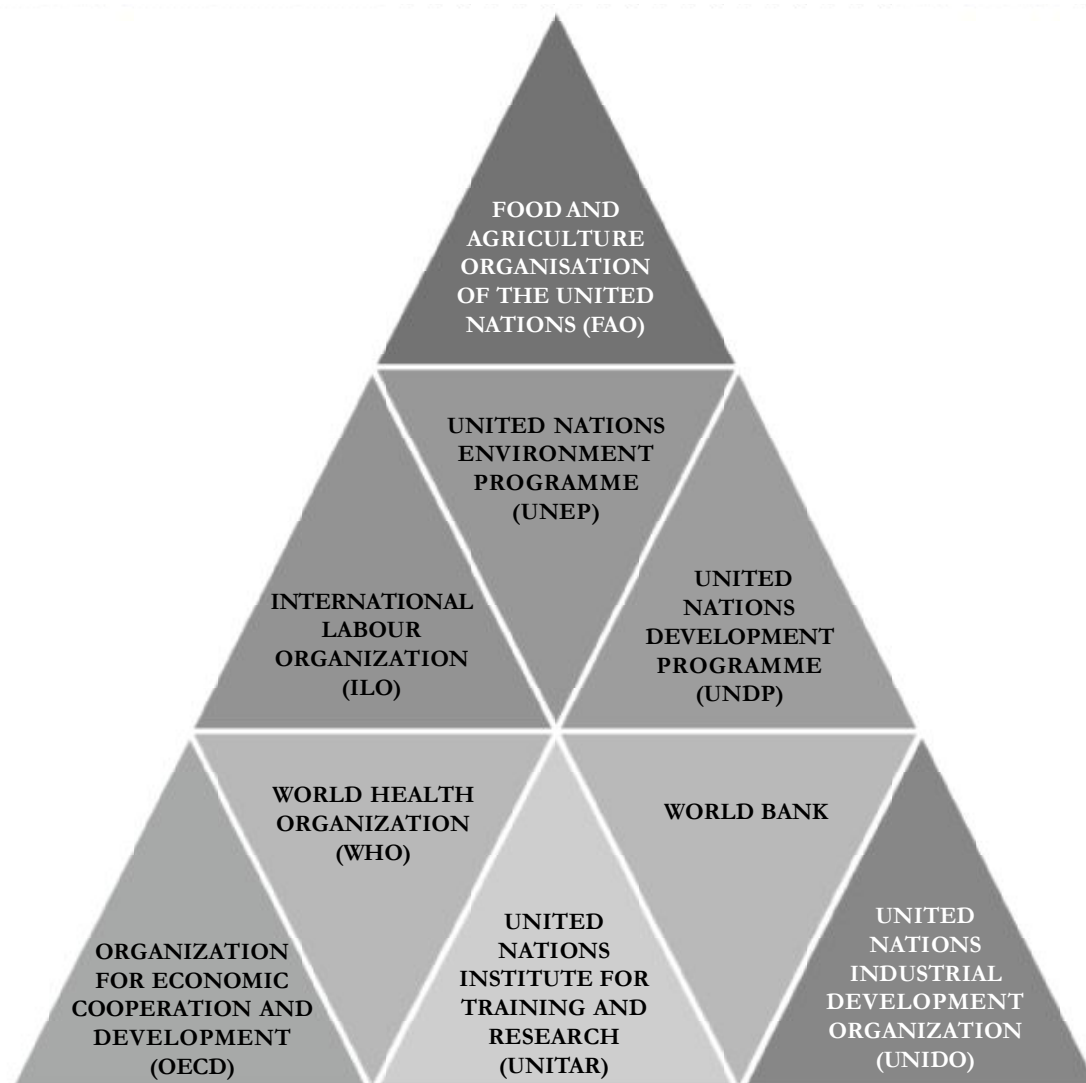
The objectives of Inter-Organizational Programme for the Sound Management of Chemicals are mainly to empower the international co-operation in the area of chemicals, to strengthen co-ordination of its policies and activities, pursued jointly or separately, to heighten the impact of the organization's international chemicals programmes, to accomplish the safe and sound management of chemicals and hazardous materials with relation to human health and the environment.

The IOMC was established in 1995 following the recommendations of the 1992 UN Conference on Environment and Development (UNCED), specifically those in Chapter 19 of Agenda 21 about toxic chemicals.

20 Sub-committee on Carriage of Cargoes and Containers, International Maritime Organization, Available at: <http://www.imo.org/en/media centre/meeting summaries/ccc/pages/default.aspx> (Last accessed on November 16, 2019).

21 International Maritime Organization, Pipeline and Hazardous Materials Safety Administration, Available at: <https://www.phmsa.dot.gov/international-program/international-maritime-organization> (Last accessed on November 16, 2019).

The IOMC brings together the following nine intergovernmental organisations:



Through the works of Inter Organization on Programme of the Sound Management of Chemicals (IOMC), a sustainable future is created through coordinated global actions with the purpose of achieving the sound lifecycle management of chemicals and waste for the betterment of human health and the environment. The IOMC participating organizations have helped most of the developing nations to strengthen their capacity for achieving the purpose of mainstreaming the safe and sound management of chemicals and wastes, all of which is a result of the commitment of IOMC towards promoting coordination of its policies and activities. For the purpose of promoting the sound management of chemicals and wastes, the IOMC shows utmost dedication towards facilitating a comprehensive set of technical and scientific tools. It also has immense opportunities which provide for green jobs.²²

2.2.6 UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

The United Nations Development Programme (UNDP) is the development network of the United Nation which operates at a global level. Its activities include sponsoring and advocating change and uniting and interlinking countries to “*knowledge, experience and resources*” with the purpose of assisting people in building a better life . UNDP offers and provides “*expert advice, training and monetary grants*” assistance to developing countries, with special emphasis on providing support to the least developed countries (LDCs). It’s activities also include promotion of “*technical and investment cooperation*” among countries. UNDP has its headquarters in the city of New York. The present legal statues of UNDP within the United Nations framework is of an executive board within the United Nations General Assembly.

The sound management of chemicals and wastes is an important component of UNDP’s efforts to achieve sustainable, inclusive and resilient human development and the Sustainable Development Goals (SDGs). UNDP advocates for integrating chemicals management priorities into national environmental and poverty reduction planning frameworks, helps countries access financial and technical resources, and provides

22 Chemicals and Waste Management, United Nations Development Programme, Available at: <https://www.undp.org/content/undp/en/home/2030-agenda-for-sustainable-development/planet/environment-and-natural-capital/chemicals-and-waste-management.html> (Last accessed on November 16, 2019).

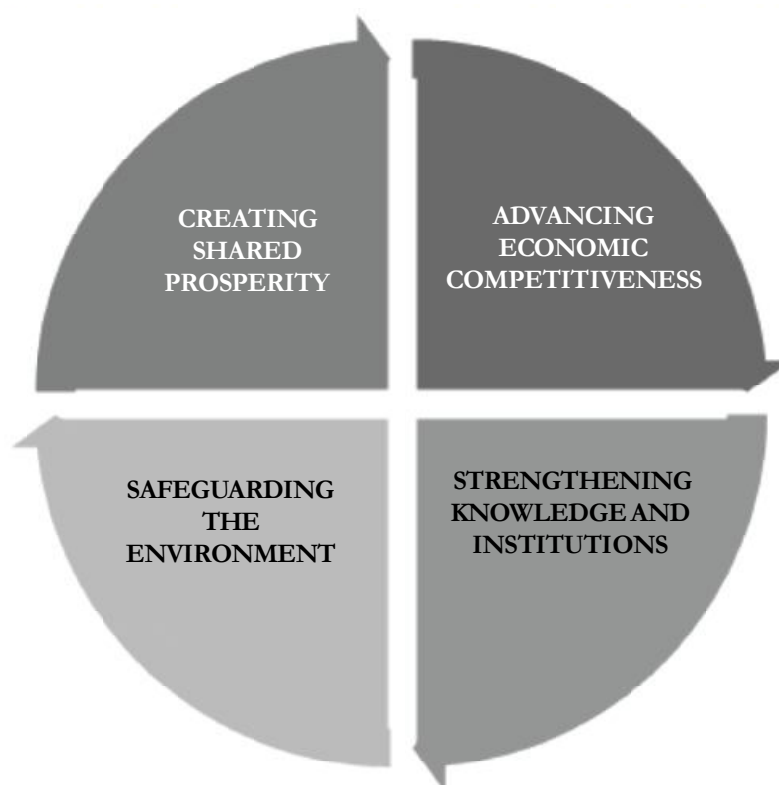
technical assistance and implementation support to improve the holistic management of chemicals and waste at national, regional and global levels. UNDP's expertise covers management of chemicals harmful to human and environmental health, including Persistent Organic Pollutants (POPs), Ozone Depleting Substances (ODS), Mercury, Lead, and other heavy metals. UNDP helps countries strengthen their waste management systems, including waste prevention, reuse or recycling, treatment and disposal. Safe and effective treatment of hazardous medical waste through innovative technologies is also one of its initiatives. UNDP activities on chemicals and waste management are carried out in cooperation with the Global Environment Facility (GEF), the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), Secretariat of the Stockholm Convention on Persistent Organic Pollutants, Secretariat of the Minamata Convention on Mercury, and a broad range of bilateral, private sector and civil society partners.²³

2.2.7 UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

The United Nations Industrial Development Organization (UNIDO), is a specialized agency in the UN Framework. It is headquartered in Vienna, Austria. The mandate of UNIDO, as prescribed in the Lima Declaration, is the promotion and acceleration of “*Inclusive and Sustainable Industrial Development*” (ISID) in the member states. It is also a member of the United Nations Development Group.²⁴ The 2030 Agenda for Sustainable Development and the associated Sustainable Development Goals (SDGs) recognised the importance of ISID as an integrated approach to all of the three pillars of sustainable development. UNIDO's mandate is fully recognized in SDG-9, which calls to “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”. Accordingly, the Organization's programmatic focus is structured, as detailed

²³ *Ibid.*

²⁴ United Nations Industrial Development Organization, Available at: <https://www.unido.org/who-we-are/unido-brief> (Last accessed on November 16, 2019).



Responding to the urgent need of phasing out the production and consumption of ODSs, which lead to the continuing degradation of human health and the natural environment, as enunciated in the Vienna Convention and the Montreal Protocol the UNIDO assists governments of developing countries that are signatories to the Montreal Protocol to comply with its requirements through transferring non-ODS-(Ozone Depleting Substances) based technologies to Article 5 countries and supports them to meet the set targets in terms of tonnages of ODS to be eliminated. There is a commitment on the part of governments that are parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) to implement legal, organizational and environmental management measures,

25 *Ibid.*

including substantive technological changes, in order to comply with the requirements of the Convention. UNIDO also assists countries in reaching compliance with the Stockholm Convention and develops capacities in developing countries to protect their populations and their environmental resources from POPs-related pollution. UNIDO also supports countries in addressing the commitments under the Minamata Convention on Mercury.²⁶

The UNIDO-GEF project, “Strengthening of National Initiatives and Enhancement of Regional Cooperation for the Environmentally Sound Management of POPs in Waste of Electronic or Electrical Equipment (WEEE)” approved in the year 2014 assists 13 Latin American countries both technically and financially, advising on e-waste policies and regulations, suitable management technologies, business models, capacity-building and awareness-raising. At the national level, the project seeks to strengthen policies and train technical staff and government officials. At the regional level, the project seeks to harmonize key aspects of e-waste policies and strengthen regional cooperation and knowledge exchange. Through this project, recycling services and high-quality recyclable materials would be provided, generating significant numbers of direct decent jobs and work opportunities. This project also seeks to develop a circular economy approach that would go a long way in protecting the environment from hazardous wastes, chemicals and emissions, recover raw materials and provide affordable refurbished products.²⁷

2.2.8 UNITED NATIONS INSTITUTE FOR TRAINING AND RESEARCH (UNITAR)

The United Nations Institute for Training and Research (UNITAR) set up in 1963 is a dedicated training arm of the United Nations system. UNITAR provides training and capacity development activities to assist mainly developing countries with special attention to Least Developed Countries (LDCs), Small Island Developing States (SIDS) and other

26 Safeguarding the Environment, United Nations Industrial Development Organization, Available at: <https://www.unido.org/our-focus/safeguarding-environment> (Last accessed on November 16, 2019).

27 Regional Co-operation on E-waste Management in Latin American Countries, UNIDO, Available at: <https://www.unido.org/ewastelac> (Last accessed on November 16, 2019).

groups and communities who are most vulnerable, including those in conflict situations. It is headquartered at Geneva, Switzerland. UNEP's International Environmental Technology Centre (UNEP IETC) and UNITAR have prepared "Guidelines for National Waste Management Strategies: Moving from Challenges to Opportunities". These guidelines serve to respond to calls for UNEP (through UNEP Governing Council resolutions 25/8 and 26/3) to support national implementation of integrated waste management and to the Rio+20 call for development of comprehensive national waste management strategies (paragraph 218 of the outcome document, "The Future We Want"). The strategy guidelines are intended to foster an overarching approach to national waste management planning. They build upon the already existing material previously developed to provide technical support for management of individual waste streams or parts of the waste life-cycle, and to support planning in related fields such as chemicals management. The strategy guidelines also take account of recent policy emphases relating, for example, to "green economy" objectives, connections between waste management and climate change, and the potential for greater resource recovery from waste.²⁸

The UNITAR has launched a new module on Gender, Chemicals and Waste that was launched at the side event "Integrating Gender into Sound Management of Chemicals and Waste", held on 9 May 2019, in Geneva, Switzerland, during the 2019 meetings of the Conferences of the Parties (COPs) to the Basel, Rotterdam and Stockholm (BRS) Conventions. This online module has as its audience, specialists, development practitioners and policy-makers working on chemicals and waste management and primarily focuses on describing the relationship between gender, chemicals and waste, identifying key international commitments on gender equality and sound management of chemicals and waste, explaining how gender equality contributes to sound management of chemicals and waste and providing examples of gender-responsive initiatives on chemicals and waste safety.²⁹

28 Waste Management, United Nations Institute for Training and Research, Available at: <https://www.unitar.org/sustainable-development-goals/planet/our-portfolio/waste-management> (Last accessed on November 16, 2019).

29 New Module on Gender, Chemicals and Waste, UNITAR, Available at: <https://unitar.org/about/news-stories/news/new-module-gender-chemicals-and-waste-available-online> (Last accessed on November 16, 2019).

2.2.9 WORLD BANK

The World Bank created at the 1944 Bretton Woods Conference, provides financial and technical assistance to developing countries around the world. The World Bank Group comprises five institutions managed by their member countries which include the following:³⁰



The World Bank, World Health Organization, and United Nations Environment Programme have cooperated in the preparation and issuance of a manual on the Safe Disposal of Hazardous Wastes. This three-volume manual is intended for administrators and technical staff, primarily in developing countries, who have responsibilities for waste management, public health and environmental protection. The manual includes information on the classification of hazardous waste, its effects on health and the environment, the planning and implementation of programs in hazardous waste management, hazardous waste treatment, and disposal technologies, including economic and institutional considerations. The manual primarily emphasises on the management aspects and on the technologies that may be appropriate for implementing a region-wide hazardous waste management program. Practical illustrations in the form of case studies from developing countries have been incorporated. Sufficient information is provided in

³⁰ World Bank, Available at: <https://www.worldbank.org/en/about/what-we-do> (Last accessed on November 16, 2019).

the manual for conducting at least a pre-feasibility assessment of various options for a hazardous waste management program. A particularly useful section of this manual includes the examples of various operating systems for hazardous waste tracking and disposal, waste survey questionnaires and techniques, and landfill design and management practices.³¹ Since 2000, the World Bank has committed over \$4.7 billion to more than 340 solid waste management programs in all six regions of World Bank engagement.³²

2.3 ORGANIZATIONS WORKING IN THE FIELD OF CHEMICALS AND HAZARDOUS WASTE MANAGEMENT AT THE REGIONAL LEVEL

2.3.1 EUROPEAN UNION

Headquartered at Brussels, Belgium, the European Union (EU), a political and economic union of 28 member states of Europe came into force on November 1, 1993. Drawing up of a waste management plan, by all Member states of EU is a requisite as per Article 28 of the Waste Framework Directive (WFD). The entire geographical territories of all member states should be covered in the plans, so drafted, and it should be in accordance with the provisions of Article 1 WFD, Article 4 WFD, Article 13 WFD, Article 14 WFD and Article 16 WFD.³³ The 7th Environmental Action Programme, which would guide European environment policy until 2020; recently extended up to 2050, sets out a number of pertinent objectives for waste policy in EU which include the following:

- To reduce the amount of waste generated;
- To maximise recycling and re-use;
- To limit incineration to non-recyclable materials;

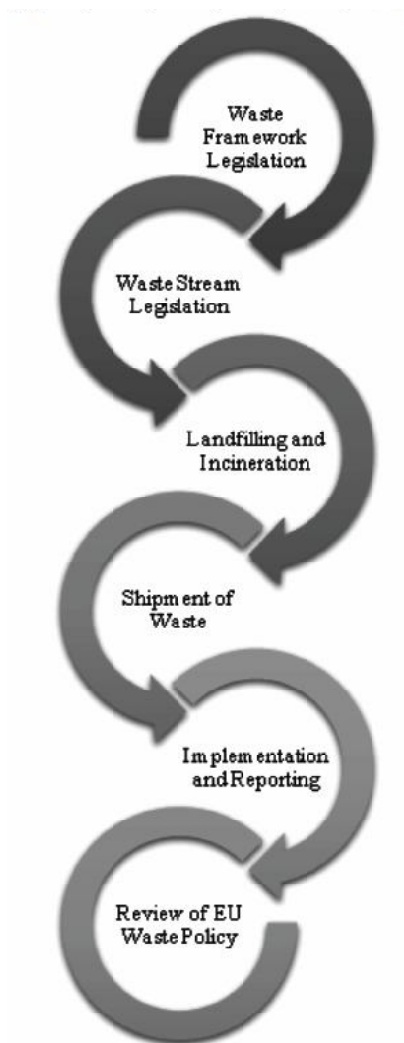
31 The Safe Disposal of Hazardous Waste, World Bank Technical Paper Number 93, Available at: <http://documents.worldbank.org/curated/en/695131468764392542/pdf/multi-page.pdf> (Last accessed on November 16, 2019).

32 Solid Waste Management, The World Bank, Available at: <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management> (Last accessed on November 16, 2019).

33 Waste Management Planning, European Union, Available at: <https://ec.europa.eu/environment/waste/plans/index.htm> (Last accessed on November 16, 2019).

- To phase out landfilling to non-recyclable and non-recoverable waste;
- To ensure full implementation of the waste policy targets in all Member States.³⁴

An emphasis is laid on the following areas to ensure that the objectives set are achieved:



34 7th EAP—The New General Union Environment Action Programme to 2020, Available at: <https://ec.europa.eu/environment/pubs/pdf/factsheets/7eap/en.pdf> (Last accessed on November 16, 2019).

Some recent initiatives have been taken by the EU in the field of hazardous waste management. The European Commission, the Executive Branch of the EU responsible for the proposing legislation, upholding EU treaties and managing the day to day business of EU has adopted the report on the implementation and on the impact on the environment and the functioning of the internal market of the Batteries Directive (2006/66/EC) on the 9th of April 2019.³⁵ The report evaluated the implementation of the Battery Directive³⁶ which has been the only EU legislation on batteries. The environmental impact of the batteries in so far as the hazardous components that they contain are addressed by the directive. It further directs reducing the hazardous components in batteries and establishing measures to ensure the proper management of waste batteries. In so far as the level of recycling, of the waste generated from batteries are concerned the information provided by Member states reflected that, the vast majority of waste batteries collected in the EU are recycled as required by the Directive and most Member States met the Directive's recycling efficiencies targets. Lead-acid batteries accounted for the maximum recycling efficiency in almost all Member States. Data gaps are more frequent for nickel-cadmium and 'other' batteries, although the targets for these were also met.³⁷

In January 2018, the EU adopted the European Strategy for Plastics in a Circular Economy. In December 2015, the Commission while adopting the EU Action Plan for a circular economy, identified plastics as a key priority and committed itself to 'prepare a strategy

35 Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Implementation and the Impact on the Environment and the Functioning of the Internal Market of Directive 2006/66/Ec of the European Parliament and of the Council of 6 September 2006 on Batteries and Accumulators and Waste Batteries and Accumulators and Repealing Directive 91/157/Eec, Available at: https://ec.europa.eu/environment/waste/batteries/pdf/report_implementation_batteries_directive.pdf (Last accessed on November 16, 2019).

36 Directive 2006/66/Ec of the European Parliament and of the Council of 6 September 2006 on Batteries and Accumulators and Waste Batteries and Accumulators and Repealing Directive 91/157/Eec Oj L 266, 26.9.2006, P. 1, as Amended.

37 Commission Staff Working Document on the Evaluation of the Directive 2006/66/Ec on Batteries and Accumulators and Waste Batteries and Accumulators and Repealing Directive 91/157/Eec, 9th April, 2019. Available at: https://ec.europa.eu/environment/waste/batteries/pdf/evaluation_report_batteries_directive.Pdf (Last accessed on November 16, 2019).

addressing the challenges posed by plastics throughout the value chain and taking into account their entire lifecycle'. To move towards achieving the SDGs and reduce the pollution caused by plastics, the Commission vowed to focus on plastic production and use and work towards the goal of ensuring that all plastic packaging is recyclable by 2030.³⁸ This step seemed to be a necessary intervention bearing in mind the amount of plastic generated in EU to meet the demands of the economy. As per 2015 estimates, EU requires 49 million tonnes of plastic to meet its packaging, building and construction, automotive and other needs. It generated around 25.8 million tonnes of plastic every year. To counter the ill effects of plastics, the Strategy proposes to improve the economics and quality of plastic recycling by investing on recyclable designs, boosting demand for recycled products, designing harmonized collection and sorting mechanisms for plastics. The strategy also proposes to curb plastic waste and littering in sea and land, establish a clear regulatory framework for plastics with biodegradable properties, boost investment by financing the development of smarter and more recyclable plastics materials, making recycling processes more efficient and tracing and removing hazardous substances and contaminants from recycled plastics.³⁹

2.3.2 AFRICAN UNION (AU)

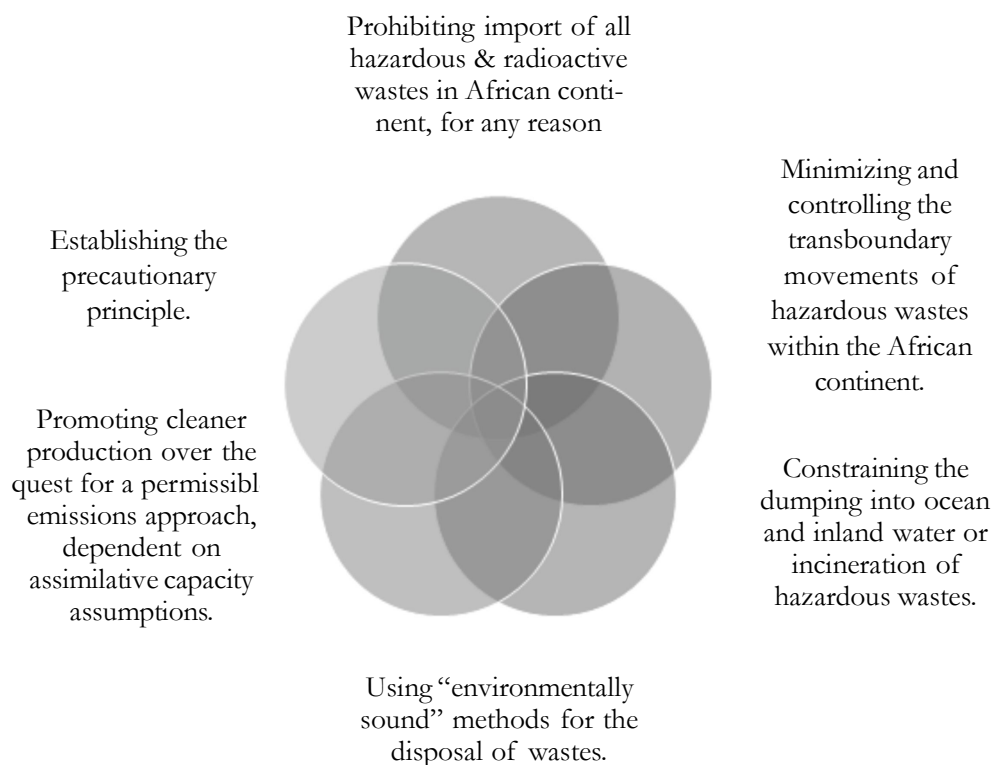
The African Union (AU) is a continental body comprising of fifty-five member states/parties which constitute the nations of African Continent, headquartered at Addis Ababa, Ethiopia. It was authoritatively inaugurated in July 2002 in Durban, South Africa, followed by an accord made by its preceding body, the Organisation of African Unity (OAU, 1963- 1999) in September of 1999, with the aim of creating an advanced continental organisation to continue its work and build on it.⁴⁰ The African Union has taken certain activities towards safe, legitimate and sound management of waste. One of the major acts of AU, regarding management of hazardous waste, is the Bamako

38 A European Strategy for Plastics in a Circular Economy. Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions, Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:2df5d1d2fac7-11e7-b8f5-01aa75ed71a1.0001.02/doc_1&format=pdf (Last accessed on November 16, 2019).

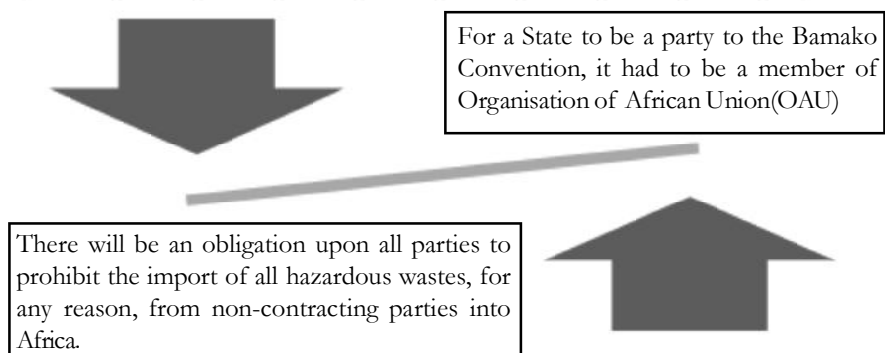
39 A European Strategy for Plastics in a Circular Economy, Available at: <https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf> (Last accessed on November 16, 2019).

40 African Union, Available at: <https://au.int/en/overview> (Last accessed on November 16, 2019).

Convention on the ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa, which came into force in 1998. The Bamako Convention emerged as a reaction to the Basel Convention which urges members/parties to go into bilateral, multilateral and regional agreements for deciding on Hazardous Waste, in order to be able to accomplish the goals of the Convention.⁴¹

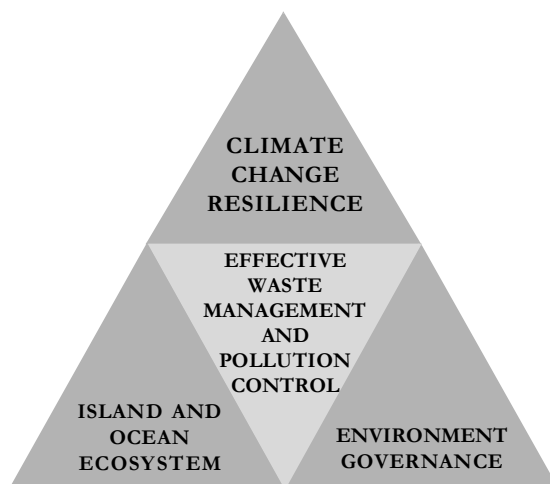


⁴¹ The Bamako Convention, United Nations Environment Programme, Available at <https://www.unenvironment.org/explore-topics/environmental-rights-and-governance/what-we-do/meeting-international-environmental> (Last accessed on November 16, 2019).



2.3.3 SECRETARIAT OF THE PACIFIC REGION ENVIRONMENT PROGRAMME (SPREP)

The Governments and Administrations of the Pacific region were delegated with the responsibility of preserving and looking after the natural resources and environment of the Pacific. They set up a regional organisation called the Secretariat of the Pacific Region Environment Programme, which is headquartered in Apia, Samoa with about 100 staff. The organisation was established in 1982.⁴²



FOUR CORE PRIORITIES OF SPREP

⁴² SPREP, Pacific Environment, Available at: <https://www.sprep.org/about-us>, (Last accessed on November 16, 2019).

The third priority of SPREP deals with the 'Effective Waste Management and Pollution Control.' The most relevant action taken with regards to the same is Waigani Convention of 2001. The Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region, popularly known as Waigani Convention, commenced on the 21st October 2001. The basic purpose of this Convention involves minimizing and eradicating the transboundary movements of hazardous and radioactive wastes, limiting the creation of hazardous and toxic wastes in the Pacific region and making sure that disposal of wastes in the Convention area is accomplished in an environmentally safe way.

The Waigani Convention is moulded on certain eminent conventions like the Basel Convention, Rotterdam Convention and the Stockholm Convention.⁴³ It basically establishes the regional operation of the international hazardous waste control system. Severe controls of the Basel Convention are applied in this Convention to the South Pacific area, and also it is made certain that any Pacific country or Antarctica is not affected by the hazardous waste travelling there from New Zealand or Australia. The Waigani Convention is considered essential for the region, due to the following reasons:

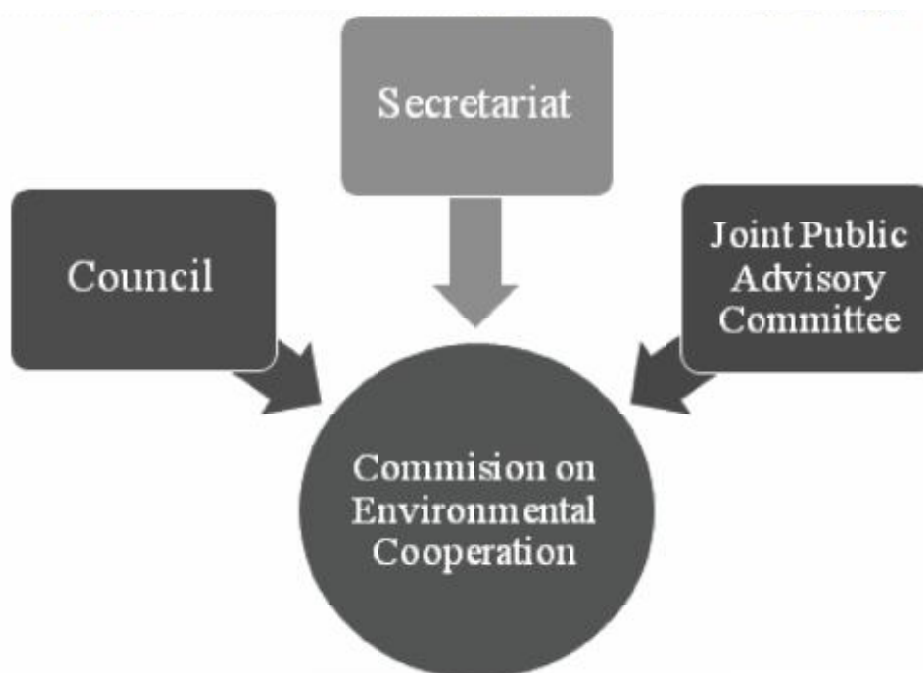
- The turning of South Pacific into an international waste dump by waste traders can be prevented by keeping in place an effective protective mechanism;
- The Pacific will no longer be used as a highway by ships for hazardous waste; and
- The hazardous and radioactive wastes in the region can be cleansed by the bringing forth of a regional apparatus.⁴⁴

43 Waigani Convention, SPREP Pacific Environment, Available at: <https://www.sprep.org/convention-secretariat/waigani-convention> (Last accessed on November 16, 2019).

44 Description/Achievement of Initiative, Waigani Convention, Available at: <https://sustainabledevelopment.un.org/partnership/?P=7456> (Last accessed on November 16, 2019).

2.3.4 NORTH AMERICAN COMMISSION ON ENVIRONMENTAL COOPERATION (CEC)

The North American Agreement on Environmental Cooperation (NAAEC) was formed in 1994 through the collaborations of Canada, Mexico and United States for protecting the environment of North America. It was around the same time as the North American Free Trade Agreement (NAFTA) came into force and marked a commitment that liberalization of trade and economic growth in North America would go hand in hand with effective cooperation between the countries in the environmental protection of the area. To fulfil its objectives towards environment protection, NAAEC established an intergovernmental organization - the Commission for Environmental Cooperation (CEC) – to facilitate cooperation among the NAFTA partners in addressing environmental issues and environmental challenges. The CEC Secretariat is headquartered in Montreal.⁴⁵



⁴⁵ Commission for Environmental Cooperation, Available at: <http://www.cec.org/about-us/about-cec> (Last accessed on November 16, 2019).

The CEC involves itself in several environmental initiatives including climate change, green economy, ecosystems etc. In the area of pollutants it tracks the release of pollutants and supports chemicals management across North America. While it has undertaken several projects in this field, it is presently monitoring three ongoing projects

- **Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers (PRTRs) in North America:** A Pollutant Release and Transfer Register (PRTR) provides annual data on the pollutants released by facilities on site to the air, water and land, or for disposal or underground injection; and transferred off site for recycling, treatment or disposal. The North American PRTR comparability was adopted by a Resolution of the Commission in 1997. In 2002 the CEC Secretariat published the first Action Plan, with a status of the comparability of the North American PRTRs. It has been subsequently updated in 2014. The CEC's North American PRTR (NAPRTR) initiative promotes public access to PRTR data to improve understanding of the sources and management of pollutants of common concern. The data used in *Taking Stock Report* are reported by facilities to the three national PRTRs: Canada's National Pollutant Release Inventory (NPRI), Mexico's Registro de Emisiones y Transferencia de Contaminantes (RETC), and the United States' Toxics Release Inventory (TRI). Efforts are focused on adding value to the data through their integration, analysis and dissemination.⁴⁶
- **Modernizing data exchange system for hazardous waste transfers:** In compliance with the requirements of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the CEC has developed a Notice and Consent Electronic Data Exchange (NCEDE). This provides a seamless communication system that allows Canada, Mexico and the United States to efficiently transmit and respond to notices and consents that facilitates legal and environmentally-sound cross-border transport and

46 Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers (PRTRs) In North America, Commission for Environmental Cooperation, Available at: <http://www3.cec.org/islandora/en/item/11583-action-plan-enhance-comparability-pollutant-release-and-transfer-registers-prtrs-en.pdf> (Last accessed on November 16, 2019).

environmentally sound management of hazardous waste. As and when amendments are made to the domestic or international regulations, the NCEDE is updated to support efficient data exchanges and accommodate future needs.⁴⁷ With the integration of the three countries, a trilateral electronic system is in place which supports paper-less information-sharing; extensive reduction in processing delays; and efficient decision making. The NCEDE also has significant economic impact on recycling and waste management companies. In the realm of international trade, the effective management of waste aids in the creation of jobs in the three countries, since each country moves towards the development of better technology and processes to manage waste and recyclables.⁴⁸

2.4 DEFINITIONS OF HAZARDOUS WASTE ADOPTED BY INTERNATIONAL AND REGIONAL ORGANIZATIONS

ORGANIZATION	DEFINITION OF CHEMICAL AND HAZARDOUS WASTE
United Nations Environment Programme (UNEP)	Follows the definition adopted by the Basel Convention ⁴⁹ Hazardous Waste: (a) Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III (b) Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

47 Modernizing the data exchange system for hazardous waste transfers, commission for environmental cooperation, Available at: <http://www.cec.org/our-work/projects/modernizing-data-exchange-system-hazardous-waste-transfers> (Last accessed on November 16, 2019).

48 Commission for Environmental Cooperation Operational Plan 2019–2020, Commission For Environmental Cooperation, Available at: http://www.cec.org/sites/default/files/documents/operational_plans/operational-plan_19-20.pdf (Last accessed on November 16, 2019).

49 Article 1, Basel Convention Controlling Trans Boundary Movements of Hazardous Disposal of Waste, 1989 Annex I (Page 46) Annex iii (Page 50), Available at: <https://www.basel.int/portals/4/basel%20convention/docs/text/baselconvention-text-e.pdf> (Last accessed on November 16, 2019).

*Interventions of International Organisations in the Field of Chemical and
Hazardous Waste Management*

	<p>Annex I provides for the categories of wastes to be controlled which are of two categories. The first one is Waste Streams which includes waste generated in stages of production, preparation and formulation in various industries like clinical wastes from medical care in hospitals, waste pharmaceuticals, waste from heat treatment, waste tarry residues, waste from use of latex, etc. The second category includes waste having as constituents 27 types of chemicals and its compounds like Mercury and its compounds, Inorganic and Organic cyanides, Metal carbonyls, Halogenated organic solvents, Tellurium and its compounds, etc.</p> <p>Annex III provides for the list of hazardous characteristics which consists of 14 characteristics of hazardous wastes like explosive, flammable liquids and solids, oxidizing, organic peroxides, corrosive, toxic, etc.</p>
Organization for Economic Co-Operation and Development (OECD)	Hazardous wastes are wastes that, owing to their toxic, infectious, radioactive or flammable properties pose a substantial actual or potential hazard to the health of humans and other living organisms and the environment. ⁵⁰
Global Environment Facility (GEF)	<p>Has not separately defined chemical and hazardous waste.</p> <p>The GEF is charged with eliminating the most harmful chemicals, which are covered by the Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury, and the Montreal Protocol on Substances that Deplete the Ozone Layer.⁵¹</p>
International Maritime Organization (IMO)	International Maritime Organization works in tandem with the Basel Convention. ⁵² The IMO Guidelines on Ship Recycling provides for a List of Hazardous Wastes and Substances that are relevant to ship recycling in Appendix 1. ⁵³ This includes wastes and substances that

50 Glossary of Statistical Terms, OECD, Available at: <https://stats.oecd.org/glossary/detail.asp?id=1206> (Last accessed on November 16, 2019).

51 Chemicals And Waste, Global Environment Facility, Available at: <https://www.thegef.org/topics/chemicals-and-waste> (Last accessed on November 16, 2019).

52 Application of Basel Conventions to Ships, Basel Convention, Available at: <http://www.basel.int/implementation/legalmatters/ships/overview/tabid/7560/default.aspx> (Last accessed on November 16, 2019).

53 IMO Guidelines on Ship Recycling, Appendix 1, Page 26, Basel Convention, Available at: <http://www.basel.int/portals/4/basel%20convention/docs/ships/imo-guidelines-2003.pdf> (Last accessed on November 16, 2019).

	may be inherent in the ship structure, wastes and substances that may be on board the ship, and waste components that are relevant to ship recycling and which are not included in List A in the Basel Convention. Follows the definition adopted by the Basel Convention.
Inter-Organization Programme for the Sound Management of Chemicals (IOMC)	Follows the definition adopted by the Basel Convention. ⁵⁴
International Programme on Chemical Safety (IPCS)	A hazard can be defined as the set of inherent properties of a chemical, mixture of chemicals or a process that, under production, usage or disposal conditions, has the potential to adversely affect the environment or the organisms it contains. In other words, it is a source of danger. ⁵⁵
United Nations Development Programme (UNDP)	Follows the definition adopted by the Basel Convention.
United Nations Industrial Development Organization (UNIDO)	Follows the definition adopted by the Basel Convention. ⁵⁶

54 UNDP Guide for Integrating the Sound Management of Chemicals into Development Planning, UNDP, Available at: [https://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/chemicals-management/integrating-sound-management-of-chemicals-into-mdg-based-development-planning/integrating%20sound%20management %20in%20chemicals%20final%20r2.pdf](https://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/chemicals-management/integrating-sound-management-of-chemicals-into-mdg-based-development-planning/integrating%20sound%20management%20in%20chemicals%20final%20r2.pdf) (Last accessed on November 16, 2019).

55 User's Manual for the IPCS Health and Safety Guides, INCHEM, Available at: <http://www.inchem.org/documents/hsg/hsg/hsgguide.htm> (Last accessed on November 16, 2019).

56 UNIDO Calls on Manufacturers Design for Recycling, UNIDO, Available at: <https://www.unido.org/news/unido-calls-manufacturers-design-recycling> (Last accessed on November 16, 2019).

*Interventions of International Organisations in the Field of Chemical and
Hazardous Waste Management*

United Nations Institute for Training and Research (UNITAR)	A hazard is the inherent property of a substance which makes it capable of causing adverse effects to people or the environment under conditions of exposure. ⁵⁷
European Union (EU)	'Hazardous waste' means waste which displays one or more of the hazardous properties listed in Annex III. ⁵⁸ Annex III provides for the properties of Waste which renders it hazardous which consists of 15 properties like explosive, oxidizing, corrosive, toxic, irritant, carcinogenic, etc.
African Union (AU)	Relies heavily on definition adopted by the Basel Convention. As per the Bamako Convention the following substances are deemed "hazardous wastes" -(a) Wastes that belong to any category contained in Annex I of the Convention; (b) Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the State of export, import or transit; (c) Wastes which possess any of the characteristics contained in Annex II of the Convention; (d) Hazardous substances which have been banned, cancelled or refused registration by government regulatory action, or voluntarily withdrawn from registration in the country of manufacture, for human health or environmental reasons. ⁵⁹ Hazardous wastes also include waste which as a result of being radioactive are subject to any international control systems, including international instruments, applying specifically to radioactive materials. The Convention specifically excludes wastes derived from the normal operations of a ship, the discharge of which is covered under other international instruments.

57 Key Elements of a National Programme for Chemicals Management and Safety, UNITAR, Available at: http://cwm.unitar.org/publications/publications/cw/inp/key_elements.pdf (Last accessed on November 16, 2019).

58 Directive 2008/98/EC of the European Parliament and of the Council on Waste and Repealing Certain Directives Page L 312/9. Annex iii (Page L 312/25), Available at: <https://eur-lex.europa.eu/legal-content/en/txt/pdf/?uri=celex:32008l0098&from=en>, (Last accessed on November 16, 2019).

59 Article 2, Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes, 1991, Available at: https://au.int/sites/default/files/treaties/7774-treaty-0015_-_bamako_convention_on_hazardous_wastes_e.pdf (Last accessed on November 16, 2019).

	Annex I formulates the categories of waste which are hazardous wastes which are waste streams like clinical wastes from medical care in hospitals, waste pharmaceuticals, waste from heat treatment, waste tarry residues, waste from use of latex, etc., and Waste Having as Constituents Mercury and its compounds, Inorganic and Organic cyanides, Metal carbonyls, Halogenated organic solvents, Tellurium and its compounds, etc. Annex II provides for the list of hazardous characteristics like explosive, flammable liquids and solids, oxidizing, organic peroxides, corrosive, toxic, etc.
Secretariat of the Pacific Region Environment Programme (SPREP)	<p>Follows the definition of hazardous waste in the Waigani Convention, 1995, which also relies on the definition of hazardous waste under the Basel Convention.</p> <p>Hazardous Waste includes (a) Wastes that belong to any category contained in Annex I of the Waigani Convention, unless they do not possess any of the characteristics contained in Annex II; (b) Wastes that are not covered under sub-paragraph (a), but which are defined as, or are considered to be, hazardous wastes by the national legislation of the exporting, importing or transit Party to, from or through which such wastes are to be sent.⁶⁰</p> <p>Annex I formulates the categories of waste which are hazardous wastes which are waste streams like clinical wastes from medical care in hospitals, waste pharmaceuticals, waste from heat treatment, waste tarry residues, waste from use of latex, etc., and Waste Having as Constituents Mercury and its compounds, Inorganic and Organic cyanides, Metal carbonyls, Halogenated organic solvents, Tellurium and its compounds, etc. Annex II provides for the list of hazardous characteristics like explosive, flammable liquids and solids, oxidizing, organic peroxides, corrosive, toxic, etc.</p>

⁶⁰ Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within The South Pacific Region Article 2, Waigani Convention, 1995 Annex I (page 28) and Annex II (page 31), Available at: https://www.sprep.org/att/publication/000129_waigani_pdf.pdf (Last accessed on November 16, 2019).

United Nations Economic Commission For Europe (UNECE)	Follows the definition adopted by the Basel Convention.
North American Commission on Environmental Cooperation (CEC)	Hazardous wastes are industrial waste streams that may contain more than a single chemical or substance. They are typically defined by characteristics such as ignitability, reactivity, corrosiveness and toxicity. ⁶¹

2.5 DEFINITIONS OF HAZARDOUS WASTE WITHIN THE INDIAN LEGAL FRAMEWORK

Legislation	Definition of Chemical and Hazardous Waste
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 as amended in 2019	<p>Rule 3 sub-rule (17) of the Act defines “hazardous waste” as any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include –</p> <ol style="list-style-type: none">1. waste specified under column (3) of Schedule I;2. waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule II or any of the characteristics as specified in class C of Schedule II; and3. wastes specified in Part A of Schedule III in respect of import or export of such wastes or the wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule III;

⁶¹ Crossing the Border Opportunities to Improve Sound Management of Transboundary Hazardous Waste Shipments in North America, Available at: <http://www3.cec.org/islandora/en/item/10158-crossing-border-opportunities-improve-sound-management-transboundary-hazardous-en.pdf> (Last accessed on November 16, 2019).

<p>The Batteries (Management and Handling) Rules, 2001 as amended in 2010</p>	<p>Although there is no specific definition of hazardous waste, Rule 9 sub-rule (2) of the Rules provides that-</p> <p>9(2) The Joint Secretary, Ministry of Environment and Forests or any officer designated by the Ministry or an agency designated by it shall ensure that the recyclers possess appropriate facilities, technical capabilities, and equipment to recycle used batteries and dispose of hazardous waste generated.</p> <p>Moreover, Form VI that contains the particulars to be submitted for registration of facilities possessing environmentally sound management practice for recycling of used lead acid batteries requires authorization under rule 5 of the Hazardous Wastes (Management and Handling) Rules, 1989 and details of hazardous waste management, including analysis report of characterization of hazardous waste generated.</p>
<p>Bio-Medical Waste (Management and Handling) Rules, 2016 as amended in 2018</p>	<p>No specific definition of hazardous waste.</p> <p>Schedule I that lays down details of biomedical wastes categories and their segregation, collection, treatment, processing and disposal options provides that expired or discarded medicines which includes pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc. shall be sent to common bio-medical waste treatment facility or <i>hazardous waste treatment</i>, storage and disposal facility for incineration.</p> <p>The Schedule further provides that chemicals used in production of biological and used or discarded disinfectants shall be disposed of by incineration or Plasma Pyrolysis or Encapsulation in <i>hazardous waste treatment</i>, storage and disposal facility.</p> <p>Part 2 of Schedule I provides that ash from incineration of biomedical waste shall be disposed of through hazardous waste treatment, storage and disposal facility, if toxic or hazardous constituents are present beyond the prescribed limits as given in the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 or as revised from time to time. It also provides that residual or discarded chemical wastes, used or discarded disinfectants and chemical sludge can be disposed at hazardous waste treatment, storage and disposal facility.</p>

E-Waste Management Rules, 2016 as amended in 2018	<p>No specific definition of hazardous waste. But several provisions under the Rules make mention of hazardous wastes such as the following:</p> <p>Under Rule 13(3), any dismantler or recycler of e-waste seeking renewal of authorization from the State Pollution Control Board must file a certificate of compliance of effluent and emission standards, treatment and disposal of <i>hazardous wastes</i> as applicable from the concerned State Pollution Control Board or any other agency designated for this purpose.</p> <p>Rule 16 requires every producer of electrical and electronic equipment and their components or consumables or parts or spares to reduce the use of hazardous substances in the production. Every producer of applications listed in Schedule II must ensure that the limits of hazardous substances as given in Schedule II are to be complied. Moreover, the Central Pollution Control Board shall conduct random sampling of electrical and electronic equipment placed on the market to monitor and verify the compliance of Reduction of Hazardous Substances provisions and the cost for sample and testing shall be borne by the Producer.</p> <p>With regard to transportation of e-waste, Rule 19 provides that transportation of waste generated from manufacturing or recycling destined for final disposal to a treatment, storage and disposal facility shall follow the provisions under Hazardous Wastes (Management, Handling and Transboundary Movement) Rules.</p>
---	--

2.6 COMPARATIVE ANALYSIS OF THE DEFINITIONS OF HAZARDOUS WASTE ADOPTED BY INTERNATIONAL AND REGIONAL ORGANIZATIONS AND THE INDIAN LEGISLATIONS

If a comparison is made between the definition of 'hazardous waste' in the legislative framework in India in contrast to the ones adopted by international and regional organizations working in the realm of chemicals and hazardous waste management, it would be evident that most international and regional organizations have either adopted or rely upon the Basel Convention definition of 'hazardous wastes'. The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (hereinafter referred to as HWM Rules) as amended in 2019 was brought into effect owing to the domestic obligations of India subsequent to the ratification of the Basel Convention.

These Rules have adopted a definition which is similar to the definition of 'hazardous waste' under the Basel Convention. On a bare perusal of the definitions in the Indian legal framework, it is apparent that the understanding of the scope of hazardous wastes is in a rather nascent stage as there is a lack of definitional clarity as to what constitutes hazardous wastes apart from the HWM Rules. The Environment Protection Act, 1986 which is considered to be umbrella legislation does not contain a definition of hazardous or chemical waste. With respect to hazardous substances the Act empowers the Central Government to make Rules under Sections 6, 8 and 25 which again focuses on the safe handling of the hazardous substances and procedures regarding and does not explicitly refer to hazardous waste disposal. But, several Rules have been drafted that deal with the disposal of wastes, many of which could be categorized as hazardous.

With regard to the Batteries (Management and Handling) Rules, 2001, Rule 9 Sub-rule 2, this rule can be understood in the sense that the recycling of used batteries will generate hazardous waste. As a result of which, they have to be disposed in the manner in which hazardous waste is disposed. Moreover, Form VI that contains the particulars to be submitted for registration of facilities possessing environmentally sound management practice for recycling of used lead acid batteries requires authorization under rule 5 of the Hazardous Wastes (Management and Handling) Rules, 1989 and details of hazardous waste management, including analysis report of characterization of hazardous waste generated. Therefore, by implication that recycling of used batteries falls within the ambit of hazardous waste. The Bio-Medical Waste (Management and Handling) Rules, 2016, in Schedule I provides that expired or discarded medicines, ash from incineration of biomedical waste and residual or discarded chemical wastes, used or discarded disinfectants and chemical sludge can be disposed at hazardous waste treatment, storage and disposal facility. This in essence means that certain categories of bio-medical waste fall within the ambit of 'hazardous wastes'. Similar provisions have been incorporated under the E-Waste Rules. While there is no specific definition of hazardous waste under the aforementioned Rules, apart from the HWM Rules, e-waste, bio-medical waste and waste generated in the production of batteries are brought within the ambit of hazardous wastes by implication, if the Rules are read in whole.

While most of these Rules deal with chemicals and it is understood by implication that most of the hazardous waste generated contains chemicals that are harmful and hazardous, in the absence of definition of 'chemical wastes', there seems to be a gap as to what chemical wastes would form a part of hazardous wastes. Merely classifying chemical wastes as hazardous wastes would just be solving one half of the problem. Moreover, there are other wastes generated through the use of chemicals which although not covered under any of the aforementioned Rules may require specific disposal mechanisms owing to their specific characteristics. This calls for a legislative frame work in India specifically to deal with chemical waste management.

INTERNATIONAL INSTRUMENTS ON CHEMICAL AND HAZARDOUS WASTE MANAGEMENT AND INDIA

3.1 BACKGROUND FOR INTERNATIONAL REGULATION IN CHEMICAL AND HAZARDOUS WASTE MANAGEMENT

Lack of International rules and principles, catastrophic international incidents like the *Khian Sea Waste Disposal incident (1986)*, the *Bajze Rail Station Incident in Albania (1991)*, the *Atari Video game burial case (1983)*, the *Ivory Coast Toxic Waste Dump (2006)*, the *Minamata Disease Case in Japan (1956)* coupled with the rapidly growing chemical industry around the world, the amenability of developing countries to the economic exploitation by the developed countries initiated a series of steps by the global community to seek regulation of the chemical sector at the international level. Among them, first was the development of a global response to hazardous waste trade and dumping, which began in 1982, when UNEP identified hazardous waste as one of the key areas in need of global regulation.¹ In 1982, UNEP convened a working group of experts to develop principles on the management of hazardous wastes. The group developed the Cairo Guidelines for the Environmentally Sound Management of Hazardous Wastes that contained a number of principles to regulate the transboundary movement of hazardous wastes; which were meant to assist governments in arriving at their own waste policies. Because of the importance of the issue, the UNEP Governing Council authorized a working group to prepare a convention on the transboundary movement of wastes. The working group drafted the Basel Convention, which was adopted by 116 countries and the European

¹ Jennifer R. Kitt, *Waste Exports to the Developing World: A Global Response*, 7 Geo. Int'l Env. L. Rev. 485 (1995).

Community in March of 1989. Many other important international conventions followed this historic development.

The five conventions namely: the Basel Convention, the Rotterdam Convention, the Stockholm Convention, SAICM and the Minamata Convention have contributed to the development of a global regulatory framework in the management and disposal of hazardous wastes. The following section briefly discusses the important provisions of these conventions followed by the Indian response to these Conventions..

3.2 QUICK FACTSHEET OF THE CONVENTIONS

Convention	Basel	Rotterdam	Stockholm	Minamata	SAICM
Date of Adoption	22 March 1989	10 September 1998	22 May 2001	10 October 2013	6 February 2006
Date of entering into Force	5 May 1992	24 February 2004	17 May 2004	16 August 2017	N.A.
No of Signatories	53	72	152	128	N.A
No of Parties	187	161	183	114	175+ Governments and 85+ NGOs
Subject Matter	Transboundary movement of hazardous wastes	Prior Informed Consent Procedure	Persistent Organic Pollutants (POPs)	Mercury	Chemical Management
Last Conference of Parties	14 (14 th COP was held in Geneva Switzerland from April 29 - May 10, 2019)	9 (9 th COP was held from 29 April -10 May 2019 in Geneva, Switzerland)	9 (9 th COP was held in Geneva, Switzerland from 29 April- 10 May 2019)	2 (2 nd COP was held in November 2018) ²	4 (ICCM4 was held from 28 September-2 October 2015, 7 th ICCM5 Bureau was held on 9-10 th July, 2019)

² The Third Meeting of COP under the Minamata Convention is scheduled to be held from 25-29 November, 2019 in Geneva. Available at: <http://www.mercuryconvention.org/convention/conferenceoftheparties/tabid/6337/language/en-us/default.aspx> (Last accessed on 8 November, 2019).

Indian Position	Signed on: 15/03/1990 Ratified on: 24/06/1992 Entered into force for India on: 22/09/1992	India was not among the original signatory to the Rotterdam but accessioned to it on 24/05/2005 The convention became binding on India on 22/08/2005	Signed on: 14/05/2002 Ratified on 13/01/2006 Became binding on India on 13/04/2006	Signed on: 30/09/2014 Ratified on 18/06/2018	Acceded to SAICM in February 2006
------------------------	---	---	--	---	-----------------------------------

3.3 BASEL CONVENTION ON THE TRANSBOUNDARY MOVEMENT OF HAZARDOUS WASTES AND THEIR DISPOSAL (1989)

The Basel Convention of 1989 was the international community's first attempt at dealing with the problem of toxic trade at a global level.³ Officially titled The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal⁴ was adopted on 22nd March 1989 and entered into force on 5th May 1992. The management of hazardous wastes had been on the UN's agenda ever since the first Montevideo Programme on Environmental Law in 1981⁵. The process to develop and implement guidelines regulating the movement of hazardous wastes across countries was accelerated after the discovery in the mid-1980s that several countries in the developing world, especially in Africa had become the dumping ground for the hazardous wastes of the developed world. Subsequent to this, work on developing the Basel Convention began in 1987 with the approval of the Cairo Guidelines, an instrument that was designed to help governments across the world in developing their own national policies regarding hazardous wastes. In the same meeting, the Executive Director of the UNEP (United Nations Environmental Programme) was mandated to create a group that would work on making a global convention about the transboundary movement and trade of hazardous wastes.

³ Jennifer R. Kitt, *Supra* note 1.

⁴ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1 J Env Law 255–277 (1989).

This became the Basel Convention in 1989 with a Conference of Plenipotentiaries, representing 116 countries, finally ratifying the convention.

As it currently stands, the Basel Convention has 187 parties, with Vanuatu being the last entrant in 2019. The Convention has also been amended several times, with a new amendment being proposed by Norway in 2018 that aims to minimise marine pollution by restricting illegal dumping of plastic waste⁶. The amendment seeks to move plastic waste from Annexure IX of the Convention to Annexure II, which would require countries exporting plastic waste to get the informed consent of the importing country. Further, it would create stringent requirements for plastic waste to be considered non-hazardous⁷. This proposed amendment has been cautioned against by the FEAD (European Federation of Waste Management and Environmental Services), which says that the amendment is unlikely to achieve its stated objective, but will rather only serve to disrupt the growing market for plastic waste, especially in the EU⁸.

The Basel Convention has been subject to criticism regarding its ineffectiveness in achieving its stated objectives. It has been empirically found that international waste trade has actually increased since the Basel Convention came into force. The Convention has seemingly done more to legitimise international waste trade rather than reduce it. The Ban Amendment, introduced in 1995 sought to address these concerns by banning waste trade between countries mentioned in Annexure VII of the Convention and countries not mentioned thereof. However, this amendment has been easy to circumvent for countries worldwide. While international waste trade has increased, the newer parties to the convention have exhibited low levels of waste export. Some attribute this to the

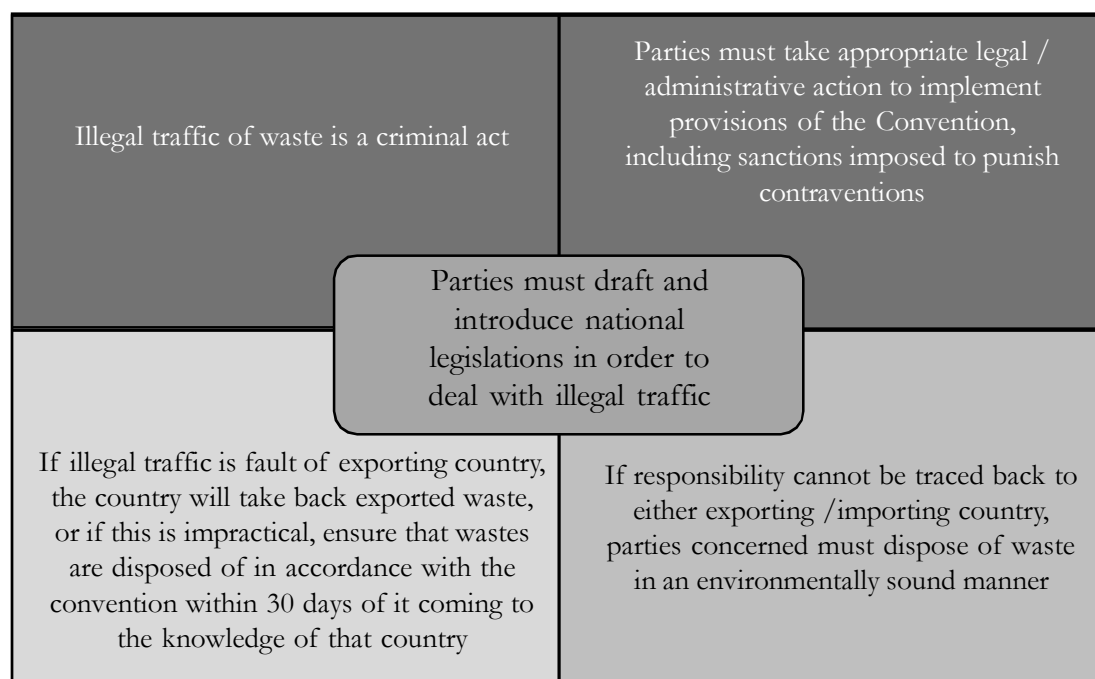
5 Montevideo Programme I, Available at: <http://wedocs.unep.org/bitstream/handle/20.500.11822/20587/montevideo-programme-i.pdf?sequence=1&isallowed=y> (Last accessed on May 8, 2019).

6 Proposed Amendments, Available at: <http://www.basel.int/theconvention/amendments/proposed/amendments/tabid/7906/default.aspx> (Last accessed on May 8, 2019).

7 Corrs Chambers Westgarth-Christine Covington & Tahnee De Souza, Murky Waters: Proposed Amendments to Basel Convention on Transboundary Movements of Hazardous Waste | Lexology, Available at: <https://www.lexology.com/library/detail.aspx?g=1c9bf2b0-8b2b-44dc-9d48-8ff636a5711c> (Last accessed on May 8, 2019).

8 Fead Slaps Down Norway's Basel Convention Amendment on Plastic Waste, (2018), Available at: <https://waste-management-world.com/A/Fead-slaps-down-norways-basel-convention-amendment-on-plastic-waste> (Last accessed on May 8, 2019).

success of the Convention, but the reality is that these countries have lower levels of waste exports simply because they are smaller countries. So, while the average waste export of the parties to the convention has decreased since it was introduced, it would be incorrect to classify this as being any sort of effect of the Convention⁹.



SALIENT PROVISIONS OF THE BASEL CONVENTION

E-waste has been a primary concern of the Basel Convention since 2002, when the MPPI (Mobile Phone Partnership Initiative) was formed at the sixth Conference of Parties (CoP) to the Basel Convention. The MPPI aims to promote the environmentally sound management of end-of-life mobile telephones. In order to achieve this, a guidance document¹⁰ was prepared and was finally adopted at the eleventh Conference of Parties

9 Derek Kellenberg & Arik Levinson, *Waste of Effort? International Environmental Agreements* 47.

10 MPPI Guidance Document, Available at: <http://www.basel.int/implementation/technicalassistance/partnerships/MPPI/mppiguidancedocument/tabid/3250/default.aspx> (Last accessed on May 10, 2019).

in 2011¹¹. At the eighth meeting of the Conference in 2006, the Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Waste¹² was adopted, giving the Secretariat of the Basel Convention a formal framework within which to operate on the development of a work plan to manage e-waste in an environmentally sound manner. In pursuance of this, the ninth Conference developed a plan that aimed to – 1) set up programmes for environmentally sound e-waste management in Africa and the Asia-Pacific. 2) Set up the Partnership for Action on Computing Equipment (PACE). 3) Prepare technical guidelines on the trans-boundary movement of e-waste. Consequently, PACE was established in 2008 as a multi-stakeholder entity that aimed to bring together computer manufacturers, recyclers, trade associations, and any other concerned party in order to tackle the issue of environmentally sound management of end-of-life computers and accessories¹³.

The Cartagena Declaration¹⁴ was adopted at the tenth Conference of Parties (CoP) to the Basel Convention in order to put forth a strong commitment by the Parties to promote the prevention and minimisation of the generation of hazardous and other wastes. This declaration was the culmination of the parties' realisation that the Basel Convention's provisions had proven inadequate to deal with the issues posed by the accumulation of waste, despite having been in force for over 20 years. The volume of hazardous waste and its trans-boundary movement had only been increasing globally since the introduction of the Basel Convention. This declaration aimed to actively promote and implement strategies for prevention and minimisation of waste generation, take measures to delink economic growth from environmental impact, and encourage greater co-operation between parties so as to ensure that there are comprehensive global and regional efforts to

11 Mobile Phone Partnership Initiative, Available at: <http://www.basel.int/implementation/technicalassistance/partnerships/mppi/overview/tabid/3268/default.aspx> (Last accessed on May 10, 2019).

12 Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Waste, Available at: <Http://www.basel.int/portals/4/basel%20convention/docs/meetings/cop/cop8/nairobideclaration.pdf> (Last accessed on May 10, 2019).

13 Partnership for Action on Computing Equipment, Available at: <http://www.basel.int/implementation/technicalassistance/partnerships/pace/overview/tabid/3243/default.aspx> (Last accessed on May 10, 2019).

14 Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes, Available at: <Http://www.basel.int/portals/4/basel%20convention/docs/meetings/cop/cop10/cartagenadeclaration.pdf>. (Last accessed on May 10, 2019).

improve access to cleaner production processes through capacity building and technology transfers.

Further, the parties directed the Open Ended Working Group (OEWG) to look at the progress that the parties had made in implementing the Declaration and to prepare a plan of action for the future. At the OEWG's ninth meeting, a road map¹⁵ was presented that formulated guidelines and mandated certain action for the effective implementation of the Declaration. At the twelfth CoP, the parties adopted the road map and further directed the Expert Working Group (EWG) on Environmentally Sound Management (ESM) to develop more guidelines that would assist parties in developing efficient strategies in order to prevent and minimise the generation of waste as a part of its regular work programme dealing with the ESM Framework. At its sixth meeting, the EWG submitted a draft guidance document¹⁶ that was to be presented at the thirteenth CoP for its consideration.

As it stands, the Cartagena Declaration continues to be an invaluable guidance document that the CoP continues to update regularly. At the most recent, fourteenth CoP, the parties agreed to continue the implementation of the Declaration through the adoption of a new and updated plan of action.

3.4 ROTTERDAM CONVENTION ON THE PRIOR INFORMED CONSENT PROCEDURE FOR CERTAIN HAZARDOUS CHEMICALS AND PESTICIDES IN INTERNATIONAL TRADE, 1998

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (hereinafter Rotterdam Convention) is an international multilateral treaty with the aim of promotion of “*shared responsibilities*” in the matter of import and export of hazardous chemicals. The Convention

15 Road Map for Action on the Implementation of the Cartagena Declaration, Available at: [http://basel.int/theconvention/openendedworkinggroup\(oewg\)/reportsanddecisions/tabid/3413/ctl/download/mid/14072/default.aspx?id=5&objid=13568](http://basel.int/theconvention/openendedworkinggroup(oewg)/reportsanddecisions/tabid/3413/ctl/download/mid/14072/default.aspx?id=5&objid=13568). (Last accessed on May 10, 2019).

16 Draft Guidance to Assist Parties in Developing Efficient Strategies for Achieving the Prevention and Minimization of the Generation of Hazardous and other Wastes and their Disposal, Available at: <Http://www.basel.int/implementation/countryledinitiative/meetings/ewg6onesm/overview/tabid/5356/ctl/download/mid/16415/default.aspx?id=1&objid=15788>. (Last accessed on May 10, 2019).

advocates and prescribes “*open exchange of information*” and requires exporters of hazardous chemicals to apply proper labelling and provide directions on safe handling, and provide information to the purchasers of any known restrictions or bans. Signatory nations of the convention can take decision on the matter of import i.e. “*whether to allow or ban the importation of chemicals which are listed in the annex of the treaty*”. To further that goal, the convention casts and obligation on the exporting countries to make sure that their producers comply with the requirement standards.¹⁷

Primary objective of the Convention is to “*Promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to parties*”

The text of the Convention was adopted on 10 September 1998 in Rotterdam, Netherlands and the Convention entered into force on 24 February 2004 and became legally binding for its parties.¹⁸ The ninth meeting of the Rotterdam Conference was held in the city of Geneva, Switzerland from 29 April - 10 May 2019.¹⁹ The Convention comprises of 30 Articles and VI Annexures.^{20 21}

The Convention applies to banned or severely restricted chemicals; and severely hazardous pesticide formulations.²² However, narcotic drugs and psychotropic substance, radioactive materials, wastes, chemical weapons, pharmaceuticals, food additives,

17 Text of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Available at: <http://www.pic.int/portals/5/download.aspx?d=unep-fao-rc-convtext-2017.english.pdf> (Last accessed on 24 October, 2019).

18 History of Rotterdam Convention, Available at <http://www.pic.int/theconvention/overview/history/overview/tabid/1360/language/en-us/default.aspx> (Last accessed on October 24, 2019).

19 Available at <http://www.brsmeas.org/2019cops/overview/tabid/7523/language/en-us/default.aspx/> (Last accessed on October 24, 2019).

20 Text of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Available at: <http://www.pic.int/portals/5/download.aspx?d=unep-fao-rc-convtext-2017.english.pdf> (Last accessed on 24 October, 2019).

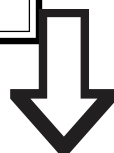
21 *Ibid*, Article 1.

22 *Ibid*, Article 3. [For the Definition of the Term Chemicals, Banned Chemicals, Severely Restricted Chemicals And Severely Hazardous Pesticide Formulation See Article 2 of the Convention].

23 *Ibid* Article 3(2).

food are not covered under the scope of the convention.²³ The Convention also does not cover chemicals in quantities which is not likely to affect human health or the environment with the condition that they are imported for the purpose of research and analysis or by an individual for his or her own personal use in quantities which is reasonable for such use.²⁴

Article 4 of the Convention mandates each party to designate national authorities for the performance of administrative functions required by the Convention.



Article 5 mandates each party to notify the Secretariat in writing of the final regulatory action regarding banned or severely restricted chemicals, that they have adopted in the form contained in Annexure.

Annexure III is one of the most important annexures to the Convention as it lists the chemicals which are subject to the Prior Informed Consent Procedure. Annexure II and IV of the Convention lays down the criteria for listing banned or severely restricted chemicals; and severely hazardous pesticide formulations, respectively, in Annexure III. Annexure V and VI contain the information requirements for export notification²⁵ and procedure for settlements of disputes,²⁶ respectively.

To achieve the objectives of the Convention the two key mechanisms established are Prior Informed Consent Procedure and Information Exchange (Article 14). Two key players involved in this process are parties to the Convention, their Designated National Authorities (DNA) (under Article 4), Conference of Parties (CoP) (under Article 18),

²⁴ *Ibid.*

²⁵ *See* Article 12.

²⁶ *See* Article 20.

Chemical Review Committee (CRC) (under Article 18(6)) and the Secretariat (under Article 19).

Prior Informed Consent Procedure:²⁷ The Prior Informed Consent Procedure is one of the mechanisms established under the convention. One of the key purpose of the PIC mechanism is the formal acquisition and dissemination of the decisions taken by the importing parties pertaining to the matter that “*whether they wish to receive future shipments of those chemicals listed in Annex III of the Convention*”. The other key function of the PIC mechanism is to ensure compliance with these decisions by the exporting parties. A Decision Guidance Document (DGD) is the starting point of the PIC procedure. It is prepared for each and every chemical which is listed under Annex III and which is subject to the PIC procedure. After preparation, the DGD is sent to all the parties. The purpose behind the DGD is to help governments in assessing the risks that are associated with the “*handling and use of the chemical*” so that they can make more informed decisions about future import and use of the chemical, considering their local conditions. Based on the DGD, all the parties are required to take decision as to whether or not they will allow future import of each of the chemicals listed under Annex III of the Convention. These decisions are known as import responses. These import responses are then circulated by the Secretariat to all the DNAs periodically every six months via a PIC Circular and they are also available on the Convention’s official website. All the exporting parties are then under an obligation to ensure that exportation of chemicals which subject to the PIC procedure do not occur in a contrary manner to the decision of the importing party. They should also ensure that the import responses in the PIC Circular are communicated to their exporters, industry and other relevant authorities such as Department of Customs etc.²⁸

27 For an in depth working of the PIC Procedure: See Frequently Asked Questions About the Rotterdam Convention on the Official Rotterdam Convention Website, Available at: <http://www.pic.int/theconvention/overview/frequentlyaskedquestions/tabid/1062/language/en-us/default.aspx> (Last accessed on October 28, 2019).

28 The Prior Informed Consent Procedure, Available at: <http://www.pic.int/theconvention/overview/howitworks/tabid/1046/language/en-us/default.aspx> (Last accessed on October 28, 2019).

Information Exchange: Information Exchange is another important requirement of the Convention and it takes place in accordance with Article 14 of the Convention. The Information exchange takes place under the convention by each party notifying the Secretariat when a domestic regulatory action to ban or severely restrict a chemical is taken. The summaries of these notifications and proposals are received by all the parties on a regular basis via the PIC Circular. When a banned or severely restricted chemical is exported by a party from its territory, then that party must notify each and every individual party which is importing that chemical before the first shipment and thereafter on an annual basis. The exports are also required to be appropriately labelled and accompanied by basic health and safety information in the form of a safety data sheet.²⁹

3.5 STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS (2001)

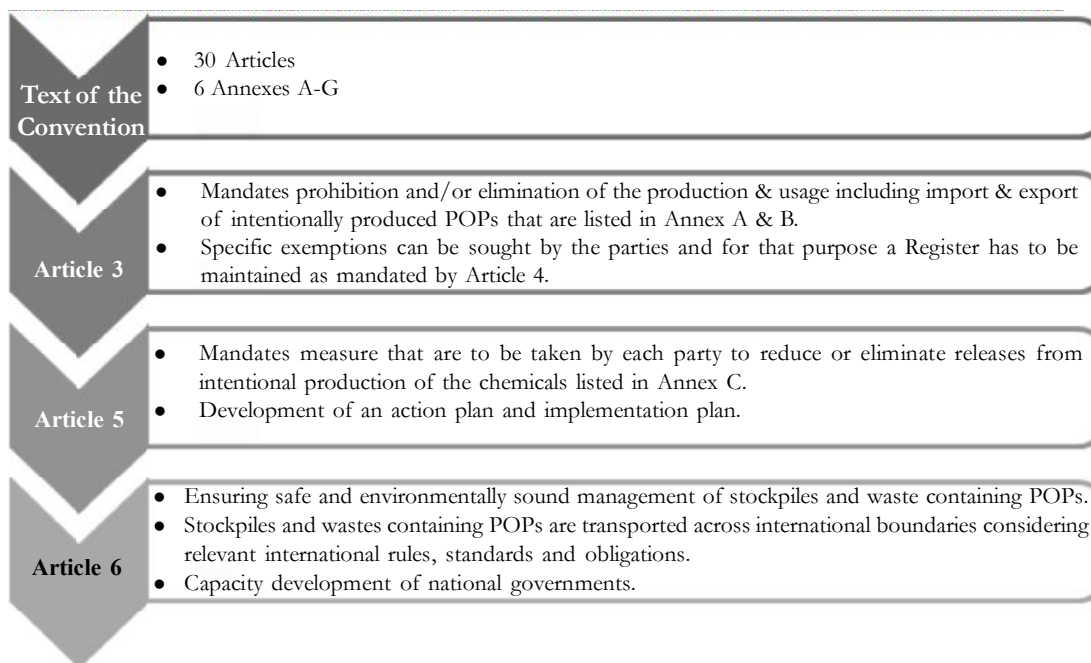
The Stockholm Convention, formally called the Stockholm Convention on Persistent Organic Pollutants, is a globally binding international treaty that aims to eliminate or restrict the production, use, storage, trade of Persistent Organic Pollutants (POPs). POPs are organic compounds that are resistant to environmental degradation through chemical, biological and photolytic processes, they bioaccumulate and are transported through air, water and migratory species, across international boundaries and are deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems.³⁰ They possess toxic properties and are hazardous for human health (especially in developing countries in particular to women). The biomagnification of POPs pose particular risks to the Arctic ecosystems and indigenous communities as they contaminate their traditional food supply.³¹ Because of long-range transport of POPs, the international community had been calling for global action to reduce and eliminate release of these chemicals which resulted in the Stockholm Convention, an important step towards minimizing

29 Information Exchange Available at: <http://www.pic.int/theconvention/overview/howitworks/tabid/1046/language/en-us/default.aspx> (Last accessed on October 28, 2019).

30 Recitals to the Stockholm Convention; *See* Text of the Stockholm Convention, *Infra* note 38.

31 *Ibid.*

risks from the impact of POPs.³² The objective of the Convention is to protect human health and the environment from Persistent Organic Pollutants.³³



3.5.1 LISTING OF CHEMICALS UNDER THE CONVENTION:

Initially the Convention contained 12 POPs called as “Dirty Dozen”.³⁴ However since its adoption the list of POPs has constantly expanded. Article 8 of the Convention provides the detailed procedure for the listing of new POPs in Annexes A, B and/or C. A party to the Convention may submit a proposal to the Secretariat for listing a chemical in Annexes A, B and/or C.³⁵ The proposal shall contain the information specified in

32 See Importance of Stockholm Convention at Toxic Links, Available at: <http://www.toxicslink.org?q=content/stockholm-convention> (Last accessed on 4 November, 2019).

33 Stockholm Convention Article 1. The Text of the Convention is Available at: <http://www.pops.int/theconvention/overview/textoftheconvention/tabid/2232/default.aspx> (Last accessed on 2 November, 2019).

34 Listing of Chemicals Under the Stockholm Convention by Toxic Links, Available at: <http://www.toxicslink.org/?q=content/stockholm-convention> (Last accessed on 3 November, 2019).

35 Article 8(1).

Annex D (This is verified by the Secretariat). Upon the verification by the Secretariat the proposal is forwarded to the Persistent Organic Pollutants Review Committee (POPRC)³⁶. The committee shall examine the proposal and apply the screening criteria specified in Annex D in a flexible and transparent way as per Article 8(3). If the Committee is not satisfied the proposal is set aside after informing the parties and observers.³⁷ But if satisfied the Committee shall make the proposal and its evaluation available to all the parties and observers and invite them to submit the information specified in Annex E.³⁸ Following this the Committee shall further review the proposal, taking into account any relevant additional information received, and shall prepare a draft risk profile in accordance with Annex E which shall go through the Secretariat, make the draft available to all parties and observers, collect technical comments from them and, taking those comments into account, complete the risk profile. Pursuant to that the Committee shall prepare a Risk Management Evaluation under provision of Article 8(7)(a).³⁹ Based on risk profile and risk management evaluation, the Committee shall recommend whether the chemical should be considered by the Conference of the Parties for listing. Finally, the Conference of the Parties shall decide whether to list the chemical and specify its related control measures in Annexes A, B, and/or C.

Other key provisions of the Convention are: the development of implementation plans⁴⁰, Information exchange⁴¹ public information, awareness and education⁴² research development and monitoring⁴³ Technical Assistance (Article 12), Financial resources

36 See Article 19(6). [POPRC is a subsidiary body formed under the convention by the Conference of the Parties].

37 However, an option of resubmission of the proposal is also provided for under Article 8(5).

38 Article 8(4).

39 However, after the risk profile conducted under Article 8(6) if the Committee decides that the proposal shall not proceed it can set aside the same under Article 8(7)(B).

40 Article 7.

41 Article 9.

42 Article 10.

43 Article 11.

and mechanisms⁴⁴ Reporting Mechanism⁴⁵, Effectiveness evaluation⁴⁶ and non-compliance⁴⁷.

3.6 STRATEGIC APPROACH TO INTERNATIONAL CHEMICALS MANAGEMENT (SAICM) (2006)

SAICM (Strategic Approach to Chemical Management) is a global policy framework and strategy with the aim of promotion of chemical safety throughout the world.⁴⁸ It was adopted by the Governments and stakeholders in the First International Chemical Conference on Chemical Management (ICCM-1).⁴⁹ It was adopted in order to protect human health and ecosystem from the harmful effects which are caused by exposure to toxic chemical substances. The scope of the SAICM includes environmental, economic, social, health and labour aspects of chemical safety; It also covers agricultural and industrial chemicals. The ultimate goal of SAICM is the promotion of sustainable development and its coverage encompasses chemicals at all stages of their life-cycle, including end products.⁵⁰ However if the health and environment safety concerns of the products and chemicals are regulated by a domestic food or pharmaceutical authority or arrangement, then to that extent they are not covered under SAICM.⁵¹ The overall objective of SAICM is the achievement of sound management of chemicals throughout their life-cycle so that, by 2020, the production and usage of chemicals take place in ways which lead to the minimization of adverse effects on human health and the environment.⁵² The primary objectives of SAICM are categorized under five themes, namely: Risk reduction,

44 Article 13.

45 Article 15.

46 Article 16.

47 Article 17.

48 SAICM Overview Available at: <http://www.saicm.org/about/saicmoverview/tabid/5522/language/en-us/default.aspx> (Last accessed on 8 November 2019).

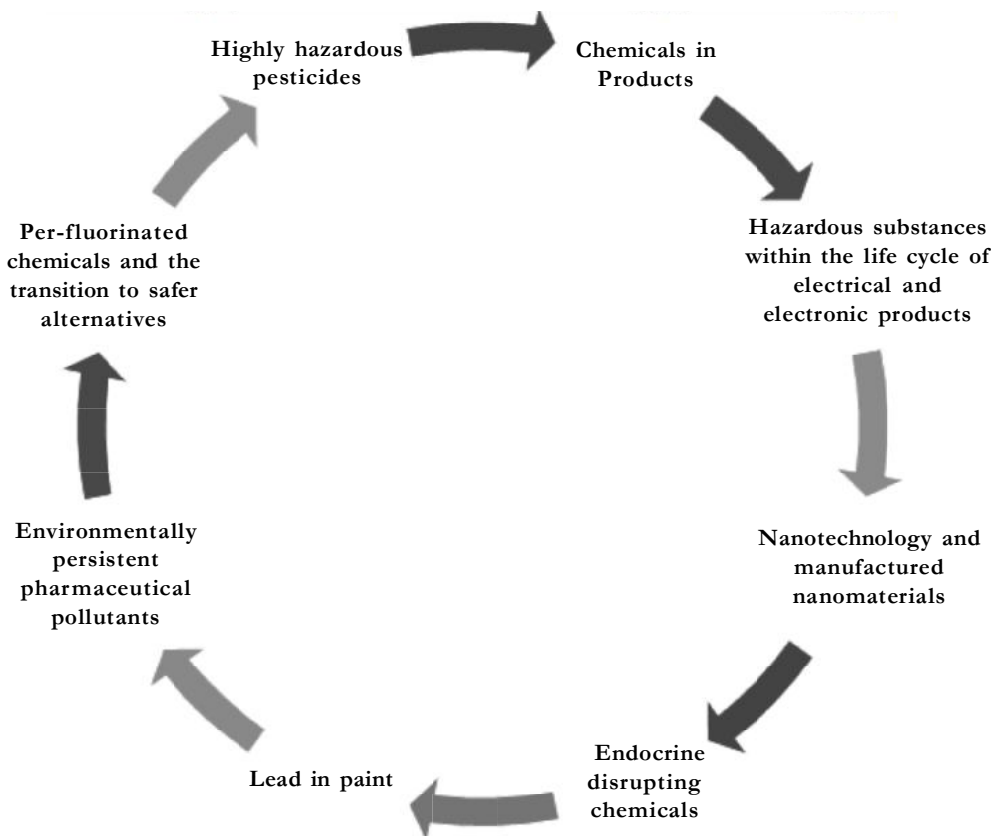
49 *Ibid.*

50 See the Text of SAICM Available at: <http://www.saicm.org/portals/12/documents/saicmtexts/saicm-publication-en.pdf> (Last accessed on 8 November, 2019).

51 See footnote to Article 3 of SAICM Text, *Ibid.*

52 Article 13 of Saicam Text, *Supra* note 50.

Knowledge and Information, Governance, Capacity-building and technical cooperation; and Illegal international traffic.⁵³ The primary instrument to achieve these objectives is the set of activities mentioned in the Global Plan of Action.



EMERGING POLICY ISSUES ADOPTED BY SAICM

These resolutions adopted recognize the policy imperatives to address identified concerns, agree on the actions needed and appeal to the specific stakeholders to consider undertaking certain actions.⁵⁴

53 See SAICM Overview Available at: <http://www.saicm.org/about/saicmoverview/tabid/5522/language/en-us/default.aspx> (Last accessed on 8 November, 2019).

54 Available at: <http://www.saicm.org/implementation/emergingpolicyissues/tabid/5524/language/en-us/default.aspx>. (Last accessed on 11 November, 2019).

3.7 MINAMATA CONVENTION ON MERCURY (2017)

The Minamata Convention on Mercury is a global treaty with the aim of protection of human health and the environment from the harmful effects of mercury.⁵⁵ It was agreed upon at the fifth session of the Intergovernmental Negotiation Committee on mercury in Geneva, Switzerland on January 19th, 2013 the convention was adopted on October 10, 2013 at a Diplomatic Conference held in Kumamoto, Japan.⁵⁶ The Convention entered into force on 16th August 2017 i.e. on the 90th day after the date of deposit of 50th instrument of ratification, acceptance, approval or accession.⁵⁷

It is noteworthy that, Minamata Convention is perhaps the only international treaty that with a focal point on a single pollutant i.e. mercury which is a global and ubiquitous metal. It occurs naturally and has multiple uses in objects of day to day life. It is released into the environment (air, soil and water) from a wide range of sources. Mercury is a highly toxic metal and metabolizes into methyl mercury naturally which is fatal for the human environment.⁵⁸ One of the key objectives of the Convention is to control the anthropogenic releases of mercury into the environment. The Convention addresses mercury throughout its life cycle including mining, manufacture, production, storage, emissions, releases, wastes and disposal. The Convention is named after the catastrophic pollution which was caused by industrial releases of methyl mercury in Minamata, Japan which caused the epidemic known as Minamata disease in the 1950s and onwards.⁵⁹

The text of the Convention comprises of 35 Articles and 6 Annexures. As per Article 1, the objective of the Convention is to protect the human health and the environment

55 Available at: <http://www.mercuryconvention.org/convention/text> (Last accessed on 5 November 2019).

56 *Ibid.*

57 *Ibid.* [See also Article 31.1 of the Minamata Convention which prescribes that the Convention shall enter into force on the Ninetieth Day after the date of deposit of the Fiftieth Instrument of Ratification, Acceptance, Approval or Accession.].

58 Jamima K Yephtho, *The Minamata Convention on Mercury and India: A Legal Review*, 4 International Journal of Legal Developments and Allied Issues 381 (2018).

59 *Ibid.*

from anthropogenic emissions and releases of mercury and mercury compounds.⁶⁰ It applies to mercury, mercury compounds and mercury added products.⁶¹ The primary focus of treaty is on: controlling and regulating mercury trade, reducing supply and usage control, lessening mercury emissions and releases, ensuring mercury emissions and releases, ensuring mercury waste handling in safe and environmentally sound manner.⁶²

Link between Basel and Minamata Convention: Elemental mercury, or mercury containing or contaminated wastes, are categorised as hazardous wastes under Annex I of the Basel Convention⁶³. The Convention has also found it prudent to develop and adopt technical guidelines regarding the environmentally sound management of mercury wastes. The first set of technical guidelines⁶⁴ were adopted at the 10th Conference of Parties. A committee was constituted at the 11th COP to update these guidelines under the leadership of Japan. The results of this update were unveiled at the 12th COP where the revised technical guidelines were adopted⁶⁵. The revised guidelines included among other things, provisions dealing with the Minamata Convention on Mercury⁶⁶ which was

60 Article 1, Minamata Convention on Mercury.

61 Article 2(d) defines Mercury as Elemental Mercury (Hg(0), Cas No. 7439-97-6); Article 2(e) defines mercury compounds as any substance consisting of atoms of mercury and one or more atoms of other chemical elements that can be separated into different components only by chemical reactions; and article 2(f) defines mercury added product as a product or product component that contains mercury or mercury compound that was intentionally added.

62 Toxic links, Mercury Free India – Right Choices, Available at: <http://toxicslink.org/docs/mercury-free-india.pdf> (Last accessed on 6 November, 2019).

63 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1 J Env Law 255–277 (1989).

64 Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury (2011), Available at: <http://www.basel.int/portals/4/basel%20convention/docs/pub/techguid/mercury/06a2r1e.pdf> (Last accessed on May 13, 2019).

65 Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury (2015), Available at: <http://www.basel.int/portals/4/download.aspx?d=unep-chw.12-5-add.8-rev.1.english.pdf> (Last accessed on May 13, 2019).

66 Minamata Convention on Mercury, Available at: <http://www.mercuryconvention.org/portals/11/documents/booklets/cop1%20version/minamata-convention-booklet-eng-full.pdf> (Last accessed on May 13, 2019).

adopted in 2013. The Minamata Convention aims to protect human and environmental health against the emission of mercury. There has been a growing tendency in recent years to move away from mercury added products, which will result in a situation where the global supply of mercury will far outstrip its demand. This excess of mercury would pose major threats to environmental stability at the scale of the Minamata disaster in the 1950s in Japan⁶⁷, if not handled and managed properly. In addition to this, the Basel Convention has forged partnerships with private and public organisations such as the UNEP Global Mercury Partnership⁶⁸. The Basel Convention assists the Mercury Partnership by providing expertise in the areas of mercury waste management; mercury supply and storage; and mercury reduction in products.

3.8 INDIAN RESPONSE AND COMPLIANCE TO THE CONVENTIONS

3.8.1 INDIA AND THE BASEL CONVENTION

India was one of the initial countries to sign and ratify the Basel Convention; having ratified the Convention on 22nd September 1992, just over four months after it had come into force. However, considering the inadequacy of the Convention's initial provisions to tackle the problem of hazardous waste movement effectively, this did not have much of an effect on India. Being a developing country, India had become a dumping ground for the waste materials of the developed countries and was one of the leading importers of waste materials in the world. The ratification of the Basel Convention had done little to change that. In an attempt to improve their situation, India and a few other developing nations came together at the first Conference of Parties to the Basel Convention and stated that developed nations had to keep their own waste rather than attempting to dump it on a developing country. India continued to maintain this stance at the second Conference as well, sowing the seeds for the introduction of the Ban Amendment to the Basel Convention, which would ban countries which were part of the OECD, i.e. developed countries from moving their wastes to non-OECD, i.e. developing countries.

However, in the next Conference, India changed its stance. At the ninth Conference, India went a step further, stating that they viewed hazardous waste as recyclable material. This transition, from being staunchly opposed to the international trade of hazardous

waste to welcoming such trade with open arms has seen India continue to be one of the largest importers of hazardous waste. The Ban Amendment, of which India was one of the early proponents has still not been ratified by the country, and has also not come into effect anywhere else nearly 25 years after it was first introduced as its fate has now fallen into the hands of the developed countries, who would much rather never see the Ban Amendment coming into force⁶⁹. Thus, it is evident that the provisions of the Basel Convention have not been able to gain significant ground in the Indian context, especially when it comes to the Ban Amendment, which continues to remain unratified. The ineffectiveness of the Basel Convention has to be rectified by trying to move away from defining the hazardous waste trade in economic terms and moving towards defining it in environmental terms.

Following the introduction of the Basel Convention, India brought in a national legislation in order to deal with hazardous wastes, the Hazardous Waste (Management & Handling) Rules, 1989 under the provisions of the Environment (Protection) Act, 1986. This legislation was found to be lacking in terms of covering the provisions of the Basel Convention and hence was amended several times throughout the years until it was finally repealed and replaced by the Hazardous Waste (Management & Handling) Rules, 2008.⁷⁰ This new legislation too was amended four times before it was replaced by the Hazardous Waste (Management & Handling) Rules, 2016 which has been recently amended in 2019.⁷¹ India also brought out a National Hazardous Waste Management Strategy in 2017.⁷²

67 M. Harada, *Minamata Disease: Methylmercury Poisoning in Japan Caused by Environmental Pollution*, 25 Crit. Rev. Toxicol. 1–24 (1995).

68 Global Mercury Partnership, Available at: <https://web.unep.org/globalmercurypartnership/> (Last accessed on May 13, 2019).

69 Mayank Aggarwal, Environment Ministry Seeks Suggestions on Global Meets on Hazardous Waste, Pollutants (2017), Available at: <https://www.livemint.com/politics/li6p64jypj4ier0vwp0zri/environment-ministry-seeks-suggestions-on-global-meets-on-ha.html> (Last accessed on May 8, 2019).

70 Hazardous Waste (Management & Handling) Rules, 2008, Available at: <http://mpcb.gov.in/hazardous/pdf/hwrulesfinalnoti240908.pdf> (Last accessed on May 9, 2019).

71 *Ibid.*

72 National Hazardous Waste Management Strategy, Available at: <https://www.informea.org/en/National-hazardous-waste-management-strategy> (Last accessed on May 9, 2019).

Alongside these frequent legislative measures taken up by the Environment Ministry, there has also been some judicial action. The most significant of these judicial tussles has to be *Research Foundation for Science, Technology & National Resource Policy v. Union of India*. This petitioner (along with many others) has filed several petitions over the years beginning in 1997,⁷³ regarding the scrapping of a ship involved in an oil spill in India, and extending all the way to 2018,⁷⁴ where the Supreme Court transferred the case to the National Green Tribunal. The gist of the various petitions filed is that the petitioners felt that the legislations brought out by the ministry were inadequate in dealing with the problem of hazardous waste, and also that they were a far cry from the provisions laid down in the Basel Convention, which they sought to emulate. There were also claims that the current policy of the government regarding hazardous waste violated several fundamental rights of the citizens.

Through its judgments in these matters, the Supreme Court established itself as a protector of the environmental rights of the citizens. In a 2012 judgment⁷⁵, the Supreme Court directed the government to ban the import of all hazardous waste as identified under the Basel Convention, and also directed it to amend the Hazardous Waste (Management & Handling) Rules and bring it in line with the Basel Convention and Articles 21, 47 and 48-A of the Constitution.

India, being a party to the Basel Convention, deals with illegal traffic of waste under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.⁷⁶ Under paragraph 15 of Chapter III of these Rules, illegal traffic of hazardous waste is defined. In essence, illegal traffic under this Rule is constituted by any trade of hazardous waste that is in contravention to the provisions of Chapter III. These provisions talk about the prior informed consent required, the approval of the Ministry of Environment,

73 *Research Foundation for Science vs. Union of India*, (1999) 1 SCC 223.

74 *Research Foundation for Science vs. Union of India*, Writ Petition (Civil) No.(s) 657 of 1995.

75 *Research Foundation for Science vs. Union of India*, (2012) 7 SCC 769.

76 Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016, Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9iv01funvszxnfmjaxni5wzgy=>. (Last accessed on May 10, 2019).

and also the various other licenses and permissions required before a party can engage in either import or export of hazardous waste. If these conditions are contravened, the legislation provides for sanctions that are similar to the ones enumerated by the Basel Convention. In cases of illegal import, the importer is liable to re-export the hazardous wastes within 90 days of its arrival to India, and if the importer is not traceable, the customs authority is free to sell the waste to anyone who is authorised under the rules to handle them, or send it to the State Pollution Control Board. As can be seen, the rules brought into force by India conform to the guidelines that have been laid down in the Basel Convention, with a few minor changes like the time period requirement.

However, the enforcement of these rules is proving to be a problem as they do not have any penal provisions with which to punish the illegal traders. The maximum amount of damage that can be caused to these traders is to force them to re-export the wastes at their own cost. While this could result in some financial difficulty for smaller traders, the bigger traders would face no significant problem, and would not be effectively deterred from continuing such operations. In the case of *P.P. Electronics vs. New Delhi (Import & General)*⁷⁷, an electronics store owner imported some Colour Picture Tubes and declared them to be new. But on inspection it was found that the tubes were old and used. An expert certified these tubes as constituting hazardous waste. The court directed the importer to re-export the goods under the Hazardous Waste Management Rules within 90 days. As has already been mentioned, this decision of the court could be seen as being detrimental to the interests of a smaller entity like the one in this case and act as an effective deterrent; however such sanctions would make no difference to the operations of a larger firm.

Thus, we can see that India has taken several steps to ensure that its waste policy framework is in accordance with the guidelines of the Basel Convention; however more needs to be done in order to ensure that these guidelines do not just remain guiding principles, but are also enforced and implemented effectively.

⁷⁷ P.P. Electronics vs. New Delhi (Import & General), Customs, Excise & Service Tax Appellate Tribunal, 2018.

3.8.2 E-WASTE AND INDIA

The management of e-wastes in India used to be for a long time governed by the Hazardous Waste Management Rules under the Environment (Protection) Act, 1986. However, in 2011, the E-Waste (Management and Handling) Rules⁷⁸ were enacted and came into effect on 1st May, 2012. This Rule allowed for the recycling of e-wastes in order to save usable materials that would have otherwise been sent directly for disposal for classifying as hazardous waste. These Rules also brought in the concept of Extended Producer Responsibility (EPR), which made the manufacturers of electronic goods liable for the safe disposal of any waste arising from such production, and also for the safe disposal of any post-consumption products. The Rules were replaced by the E-Waste (Management) Rules, 2016⁷⁹ which came into effect on 1st October, 2016.

A significant change that the E-Waste Rules have brought in was the proposal of a buy-back scheme in order to augment the EPR policy, wherein producers would have to buy products back from the consumer at the time of disposal. This gave the consumers an incentive to hand in their disposable electronics to the producer rather than disposing them off by themselves in an environmentally harmful manner. Further, there was an attempt to formalise the informal sector of e-waste disposal, which accounted for handling over 90% of the e-waste generated in the country⁸⁰. The new Rules also ushered in the concept of Producer Responsibility Organisations (PROs), further enhancing the viability of EPR. These organisations essentially take over the responsibility of e-waste management from producers for a certain price and ensure that the e-waste is recycled or disposed of in an efficient and environmentally responsible manner.

78 E-waste (Management and Handling) Rules, 2011, Availabale at: <https://www.citehr.com/attachments/113546-e-waste-management-handling-rules-2011-pdf-e-waste-mgmt-handling-rules-2011.pdf> (Last accessed on May 10, 2019).

79 E-waste (Management) Rules, 2016, Availabale at: <http://www.invironmentportal.org.in/files/file/ewm%20rules%202016.pdf> (Last accessed on May 10, 2019).

80 Dr Lakshmi Raghupathy et al., *E-waste Recycling in India – Bridging the Gap Between the Informal and Formal Sector*. Availabale at: https://www.iswa.org/uploads/tx_iswaknowledgebase/krueger.pdf. See also miles park, electronic waste is recycled in appalling conditions in india,the conversation, <http://theconversation.com/electronic-waste-is-recycled-in-appalling-conditions-in-india-110363> (Last accessed on May 10, 2019).

The Rules were amended in 2018 with the introduction of the E-Waste (Management) Amendment Rules⁸¹. The most important change that this amendment brought in was the revision of the EPR e-waste collection targets for producers. These collection targets mandate that the producers collect a certain percentage of the e-waste that has been produced as a consequence of the use of their products. Under the 2016 Rules, these targets began at 30% of the total waste generated during the first two years of the implementation of the rules, and increased by 10% every two years until after seven years, where the target would become 70% of the total quantity⁸². Under the amended Rules, these targets were brought down to 10% in the first year, 20% in the second year, and so on till the seventh year where the target would be 70%. These targets were lowered because firms were simply not conforming to them, resulting in the Central Pollution Control Board (CPCB) having to send notices to over 200 companies for not complying with collection norms⁸³. There was also a new category introduced for firms that had just begun operations, wherein their targets would begin at 5% and reach 20% after seven years. This was done in order to ensure that newer firms are not put at a disadvantage where their profitability is affected by the demands of the collection targets. Another change brought in by the amendment was that PROs are now needed to register themselves with the CPCB, thus allowing the CPCB to monitor and supervise the activities of these PROs.

There has not been much judicial action or judiciary driven policy changes in the context of e-waste in India, with most cases either dealing with the non-implementation of the provisions of the legislations enacted⁸⁴, i.e. the E-Waste Management Rules, or the penalising of illegal imports of e-waste (banned by the Hazardous Waste Management Act) by the imposition of fines and mandated re-export of the goods⁸⁵.

81 E- Waste (Managment) Amendment Rules, 2018, Availabale at: [http://www.indiaenvironmentportal.org.in/files/file/e-%20waste%20\(managment\)%20amendment%20%20rules,%202018.pdf](http://www.indiaenvironmentportal.org.in/files/file/e-%20waste%20(managment)%20amendment%20%20rules,%202018.pdf) (Last accessed on May 10, 2019).

82 *Supra* note 94.

83 Jacob Koshy, *What is India Doing with its 2 Million Tonnes of E-waste Every Year?*, The Hindu, January 13, 2018, Availabale at: <https://www.thehindu.com/eci-tech/energy-and-environment/Indias-toxic-eiffel-towers-we-produce-2-million-tonnes-of-e-waste-every-year-and-the-new-regulations-arent-helping-deal-with-it/article22429947.ece> (Last accessed on May 10, 2019).

84 Nagrikupbhokta & Ors. vs. State of M.P. & 10 Ors., National Green Tribunal, 2017.

85 P. P. Electronics vs. New Delhi (Import & General), Customs, Excise & Service Tax Appellate Tribunal, 2018.

India currently ranks fifth in terms of e-waste production in the world, producing around 2 million tonnes a year⁸⁶. It is now clear that while there are several provisions and legislations that govern the disposal of e-wastes in India; their implementation still leaves a lot to be desired. Implementation and enforcement of the enacted Rules has to become the government's main priority when it comes to managing the e-waste situation in India.

Needs and Gaps in Indian Compliance under the Basel Convention

NEEDS AND GAPS	STATUS OF COMPLIANCE
1. Need for National Definition	India has complied to the requirement of the reporting of national definition.
2. Need for Prior consent before exporting the waste.	There is no data available as to whether India did give any consent to the import of waste in the recent years.
3. Designation of competent authorities and focal point	India has complied to it.
4. National inventory should maintain about the illegal traffic either through export and import	No data available in national inventory about illegal traffic.

⁸⁶ Jaideep Shenoy, India among the Top Five Countries in E-waste Generation: Assocham-nec Study | India News – The Times of India, Available at: <https://timesofindia.indiatimes.com/india/india-among-the-top-five-countries-in-e-waste-generation-assochem-nec-study/articleshow/64448208.cms> (Last accessed on May 10, 2019).

5. Checklist for the Legislator	It is helpful for the preparation of the national inventory which would in turn help for annual national reporting of a country.
6. Strategic framework for the years 2012-2020	No reports on India's stand on Indonesian-Swiss country-led initiative and also there is a need for the data on how India would be effected by the Ban Amendment if ratified by our country.
7. Technical guidelines for e-waste, cement kilns, etc.,	India has enacted the rules and guidelines in furtherance of the Basel Convention.
8. Accident Reporting	India has Chemical Accident Information Reporting System and Accident Reporting Procedure.

3.8.3 INDIA AND ROTTERDAM CONVENTION

To perform its obligations under Article 4 of the Convention India needed to identify departments and institutions as Designated National Authorities (DNAs) which can act on its behalf to perform the various administrative functions required under the Convention.⁸⁷ India has designated Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers, and Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers' Welfare as the National Authorities under the Rotterdam Convention.⁸⁸ The Official Contact Points (OCPs) are designated in Ministry of Environment, Forests and Climate Change (MoEF&CC).

In 2017, India opposed the listing of Chrysotile asbestos as a hazardous substance under the Rotterdam Convention at the 8th CoP that was conducted in Geneva.⁸⁹

87 Article 4 of the Rotterdam Convention.

88 Available at: <http://www.pic.int/countries/countrycontacts/tabid/3282/language/enus/default.aspx> (Last accessed on October 24, 2019).

89 Available at : <https://www.hindustantimes.com/india-news/chrysotile-asbestos-not-hazardous-says-india-under-rotterdam-convention/storyqfmwglmaryhboh4e4atspo.html>. (Last accessed on October 24, 2019).

Some of the policy initiatives taken for ensuring chemical safety in the country, as well as for implementing the Convention are as follows:

Comprehensive National Chemical Profile assessing the existing institutional, administrative, technical and legal infrastructure vis-a-vis the requirements of safe handling of chemicals in the country is being prepared.

1729 Major Accident Hazard Units (MAH) in 22 States / UTs. 1569 on-site Plans and 137 Off-site plans have been prepared.

GIS based Emergency Planning and Response System developed in Gujarat, Maharashtra, Tamil Nadu and Andhra Pradesh Delhi, Assam, Haryana, West Bengal, Madhya Pradesh, Uttar Pradesh, Karnataka, Punjab, Rajasthan and Kerala.

Out of 270 districts having MAH Units, 180 have hazard prone industrial pockets. Hazard Analysis studies have been initiated for 107 districts.

Inventorization study on “Isolated Storages” carried out during 2001-02 has identified 347 Isolated Storages in the country.

As per CoP 9 of the Rotterdam Convention two new chemicals (Phorate and HBCD) were added in the list for mandatory PIC procedure in international trade.

3.8.4 INDIA AND THE STOCKHOLM CONVENTION

India became a full party to the Stockholm Convention in 2006 and issued a National Implementation Plan (NIP) in 2011⁹⁰, in accordance with Article 7 of the Convention stipulating that every party must issue an NIP. However, for a very long time India had refused to list any new POPs that the Stockholm Convention had brought in, choosing instead to stick with the original 12 chemicals that were on the list. Usually, if any new chemical is banned under the Convention, the ban also automatically applies to most parties, unless they make a special request to the Secretariat saying that they cannot accept it. India on the other hand, is a part of a select group of countries that automatically rejects a new listing unless they write to the Secretariat explicitly accepting it⁹¹. India took full advantage of this rule, choosing to do nothing with regard to the new listings for over 12 years. Even the NIP introduced in 2011, failed to take any note of the newly banned substances.⁹² Finally in 2018, the government introduced the Regulation of Persistent Organic Pollutants Rules⁹³ which imposed bans on 7 of the 14 (at the time) newly listed substances.

As can be seen, India while being a full party to the Stockholm Convention has not come into full conformity of its guidelines yet. The legislation on matters of POPs wastes is particularly weak in the country, with the first targeted legislation dealing with the matter only being brought in last year. Further, the Rules brought in last year appear only to be a half-baked attempt at complying with the norms of the Stockholm Convention, especially considering its reluctance to ban all the chemical substances listed in the Convention.

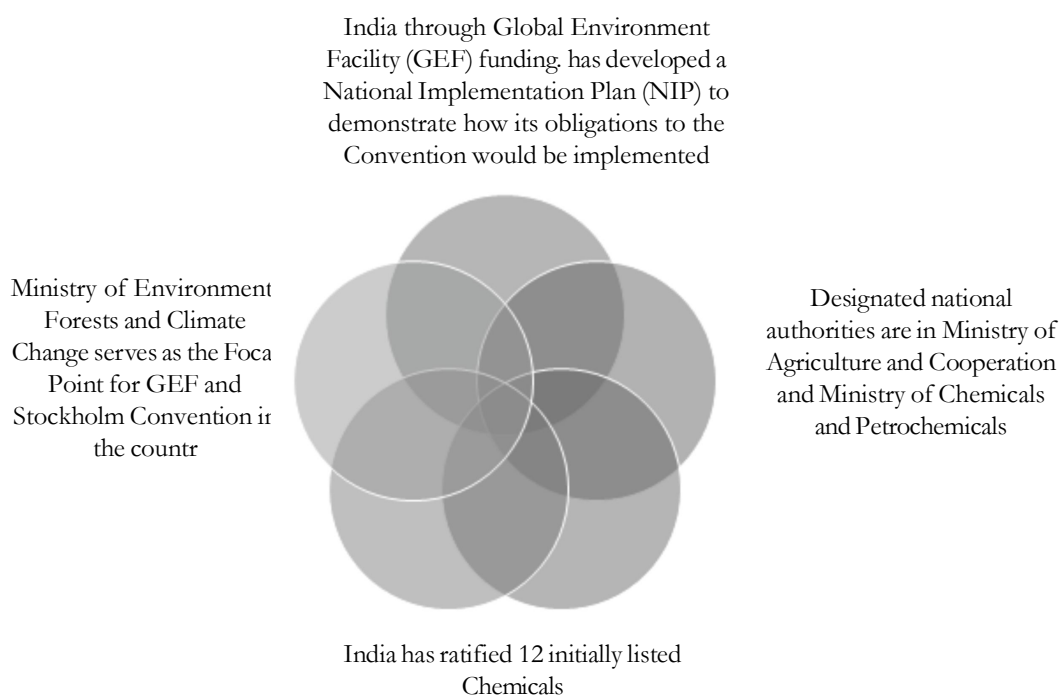
90 National Implementation Plan, Available at: <http://www.pops.int/implementation/national-implementation-plans/niptransmission/tabid/253/ctl/download/mid/13657/default.aspx?id=79&objid=11745>. (Last accessed on May 14, 2019).

91 India All Set to Accept New Persistent Organic Pollutants (POPs)? | Toxicswatch, Journal of Earth, Science, Economy and Justice, Available at: <http://www.toxicswatch.org/2017/01/India-all-set-to-accept-new-persistent.html> (Last accessed on May 14, 2019).

92 Girija Bharat, *Persistent Organic Pollutants In Indian Environment: A Wake-up Call for Concerted Action*, Available at: <https://www.teriin.org/sites/default/files/2018-02/policy%20brief%20on%20pop.pdf> (Last accessed on May 14, 2019).

93 Regulation of Persistent Organic Pollutants Rules, 2018, Available at: https://www.kspcb.gov.in/regulation%20of%20persistent%20organic_07072018.pdf (Last accessed on May 14, 2019).

Also, the enforcement of the bans actually imposed is in themselves lax. The use of pesticides for agricultural use has been banned in India since 1983, but these substances have found new life as insecticides and continue to be produced to this day, despite being banned under both the Stockholm Convention and national legislations. Thus, there needs to be a concerted attempt to rework the current legislative framework regarding POPs, in order to bring it in full compliance with the demands of the Stockholm Convention, and by extension the Basel Convention as well.



3.8.5 INDIA AND SAICM

India was among the initial countries to accede to SAICM in February 2006. Initial undertakings under the SAICM framework included:

- Development or updating of national chemicals profiles
- Strengthening of Institutions
- Mainstreaming sound management of chemicals in national strategies

To achieve these targets, India introduced the following steps:

- Preparation of the National Chemicals Management Profile to assess its infrastructure and capacity for management of chemicals. The Profile was prepared by Ministry of Environment & Forests (MoEF) and Central Pollution Control Board (CPCB) with assistance from United Nations Institute for training and Research, (UNITAR), Geneva under the auspices of Canada-India Environmental Institutional Strengthening Project, Canada.⁹⁴
- India also notified the E-Waste (Management and Handling) Rules, 2011 for the management of electronic waste.⁹⁵
- In line of Globally Harmonized System, India finalised the draft Dangerous Goods (Classification, Packaging, and Labelling), Rules, 2013.⁹⁶ Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is a system for the classification and labelling of chemicals as per their intrinsic hazardous properties and is a cornerstone of sound chemical management.⁹⁷ However, as of 2017 India has not implemented the GHS.⁹⁸
- MoEF also initiated studies of inventorisation of lead, cadmium, mercury and arsenic in paints, distemper and pigments in the country.
- Discussions with leading national laboratories.

94 The Text of the National Chemical Management Profile is Available at: [Http://164.100.107.13/upload/newitems/newitem_112_nationalchemicalmgmtprofileforindia.pdf](http://164.100.107.13/upload/newitems/newitem_112_nationalchemicalmgmtprofileforindia.pdf) (Last accessed on 11 November, 2019).

95 Available at <http://toxicslink.org/docs/rulesandregulation/e-waste-rule-guidelines.pdf> (Last accessed on 11 November, 2019).

96 The Rules are known as Hazardous Substances (Classification, Packaging and Labelling) Rules, 2011. Available at: http://www.indiaenvironmentportal.org.in/files/file/so523_e_new.pdf (Last accessed on 11 November, 2019).

97 Linn Persson Et Al, *The Globally Harmonized System of Classification and Labelling of Chemicals – Explaining The Legal Implementation Gap*, 9 Sustainability 2176 (2017).

98 *Ibid.*

India and Emerging Policy Issues under SAICM

1. **Lead in Paint:** Lead is a heavy and highly toxic metal. From a historical perspective, the adding of lead compounds to oil-based decorative and industrial paints etc is done for enhancement of colour, reduction in corrosion on metal surfaces and reduction in the time it takes the paint to dry.⁹⁹ After the lead paint is applied, the release of lead particles into dust and soil occurs due to the process of weathering, peeling or chipping of the paint.¹⁰⁰ The use of such paints in home, schools, playgrounds and other locations exposes the children to lead exposure and is one of the main source of such exposure.¹⁰¹ The exposure to lead can lower Children's IQ¹⁰² and can cause permanent damage to the brain and nervous system and increased behavioural problems. Hypertension, kidney damage, impaired reproductive system are other health risks which are caused by lead paint exposure.¹⁰³ Global Alliance to Eliminate Lead Paint (Lead in Paint) is a joint initiative by the UNEP and World Health Organization (WHO) with the aim to prevent children's exposure to lead from paints. Regulation of lead paint with the ultimate objective of phasing out Lead use in paints is one of the components of SAICM Global Environmental Facility Project.¹⁰⁴

India and Lead Paint: As per a study conducted by Centre for Science and Environment (CSE) in 2008 and 2009 the quantity of lead, in most of the popular brands of paints in India, was very high. (more than 1000ppm)¹⁰⁵ The standards

99 See UNEP, Update on the Global Status of Legal Limits on Lead in Paint September 2019, Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/30110/2019_global_update.pdf?Sequence=1&isallowed=y (Last accessed on 14 November, 2019). [The Global Update is provided annually by the UNEP and Global Alliance to eliminate Lead Paint (Lead Paint Alliance)]

100 *Ibid.*

101 *Ibid.*

102 *Infra* note CSE India Study.

103 *Supra* note UNEP Global Status Update.

104 Available at <http://www.saicm.org/implementation/emergingpolicyissues/leadinpaint/saicmgefprojectleadinpaintcomponent/tabid/7801/language/en-us/default.aspx> (Last accessed on 14 November 2019).

105 Available at: <https://www.cseindia.org/paints-in-india-have-unacceptable-levels-of-toxic-lead-7536> (Last accessed on 14 November, 2019).

of lead in paint in India are determined by Bureau of Indian Standards (BIS)¹⁰⁶, which replaced the erstwhile Indian Standards Institution (ISI) which was determining the Indian standards since 1947.¹⁰⁷ Since 1950 till 2004, the standard for lead in paints in India were set at 1000 ppm.¹⁰⁸ However, vide IS 133: 2013, BIS revised the standards to 90 ppm¹⁰⁹, a limit accepted by the other developed countries including USA, Canada and China.¹¹⁰ However, the BIS Standard is of voluntary nature unlike certification, the paint manufactures are not bound to meet the BIS Standard.¹¹¹ Thus, the Indian paint industry remains virtually unregulated for the lead content. And as per the Reports published by Toxics Link in the year 2009 and 2011, high concentration of Lead was detected in some of the leading paint manufacturers in India.¹¹²

To meet the SAICM objectives, the Government of India notified the **“Regulation on Lead contents in Household and Decorative Paints Rules, 2016”** on 1st November, 2016 which came into force from 1st November, 2017.¹¹³ This initiative by the Union Government will hopefully pave the way for lead free paints in India.

106 BIS was established under the Bureau of Indian Standards Act, 2016 which revised the earlier Bureau of Indian Standards Act, 1986. It replaced the erstwhile Indian Standards Institution [ISI].

107 Available at: <https://bis.gov.in/index.php/standards/> (Last accessed on 14 November, 2019).

108 Available at: <http://toxicslink.org/?q=content/bureau-indian-standards-bis-notifies-lead-standards-paints-90-ppm> (Last accessed on 14 November, 2019).

109 *Ibid.*

110 See *Supra* note UNEP, Update on the Global Status of Legal Limits on Lead in Paint September 2019.

111 See CSE, Lead in Paints Report (August 2009) PML/PR-34/2009, Available at: http://indiaenvironmentportal.org.in/files/lead_paints.pdf (Last accessed on 14 November, 2009).

112 *Supra* note, Toxic Links Available at: <http://toxicslink.org/?q=content/bureau-indian-standards-bis-notifies-lead-standards-paints-90-ppm> (Last accessed on 14 November, 2019).

113 Available at: <https://www.cpcb.nic.in/openpdf.php?id=tmv3c0zpbgvzlu3xze0otu0ndcyodbfbbwvkawfwag90bzm5ntkumdm=>.

2. **Chemical in Products:** Chemical in products (CiP) is another emerging policy issue on which resolutions have been adopted. The Fourth Session of International Conference on Chemicals Management (ICCM4) in 2015 launched the Chemicals in Products Programme which is a voluntary framework for all SAICM Stakeholders.¹¹⁴ It is a global initiative which is aimed at management of chemicals in products with the ultimate objective of reducing the risk to the human health and the environment posed by hazardous chemicals in products.¹¹⁵ CiP is recognized by SAICM as fundamental in the achievement of SAICM 2020 goals.¹¹⁶ The three key objectives to achieve this goal are:

- a. **Exchange of Information and Knowledge within the supply chains** on chemicals in products, associated hazards and sound management practices.
- b. **Disclosure of** relevant information to stakeholders **outside the supply chain** to enable informed decision making and actions about chemicals in products.
- c. **to ensure** that information is accurate, current and accessible, through **due diligence**.¹¹⁷

SAICM CiP Programme operates with the central principle that “*All Stakeholders should have access to relevant and reliable information to make informed decisions about chemicals in products*”¹¹⁸ The striking feature about the SAICM CiP Programme is that it addresses chemicals in production throughout the entire supply chain

114 Available at: <http://www.saicm.org/implementation/emergingpolicyissues/chemicalsinproducts/tabid/5473/language/en-us/default.aspx> (Last accessed on 14 November, 2019).

115 Available at: <https://www.unenvironment.org/resources/toolkits-manuals-and-guides/welcome-saicm-chemicals-products-programme> (Last accessed on 14 November, 2019).

116 *Ibid*.

117 Saicm Chemicals in Products Programme, Available at https://wedocs.unep.org/bitstream/handle/20.500.11822/27791/cip_background_brief_english.Pdf?Sequence=1&isallowed=y (Last accessed on 14 November, 2019).

118 *Ibid*.

starting with basic chemicals suppliers to the ultimate recyclers. This life cycle includes chemical product formulators, raw materials manufacturers, component manufacturers, end product manufacturers, distributors, retailers, consumers, waste managers, governments and NGO's.¹¹⁹ Thus the CiP Programme envisages the flow of information to coincide with product flow.¹²⁰

India and CiP: India formulated its Draft National Action Plan for chemicals (NAPC).¹²¹ This is proposed to take place within the aegis of World Bank under the capacity building project for industrial pollution management. The project is aided by the World Bank.¹²² Embracing of green and sustainable chemistry is another major area looked under SAICM and India, through the Ministry of Education is piloting a programme under which all chemists are mandated to take a one-year course in green chemistry.¹²³ To support such efforts at primary, secondary, tertiary and professional levels green and sustainable chemistry tools and materials are being provided.¹²⁴

3. Hazardous Substances within the life cycle of electrical and electronic products: The work on Hazardous Substances within the life cycle of Electrical and Electronic Products (HSLEEP) is led by the United National Industrial Development Organization (UNIDO).¹²⁵ UNIDO has been working with the secretariats of the Basel, Rotterdam and Stockholm Conventions and UNEP

119 The Flow Chart of the CiP Information Flow or Request is Available at: [http://www.saicm.org/portals/12/documents/epi/guidance% 20for% 20 stake holder %20in%20exchanging% 20cip% 20information_october2015.pdf](http://www.saicm.org/portals/12/documents/epi/guidance%20for%20stakeholder%20in%20exchanging%20cip%20information_october2015.pdf) (Last accessed on 14 November, 2019).

120 *Ibid.*

121 Available at: <https://chemicalwatch.com/60306/india-to-have-a-national-action-plan-for-chemicals-by-2018> (Last accessed on 14 November 2019).

122 Available at: <https://chemicalwatch.com/60306/india-to-have-a-national-action-plan-for-chemicals-by-2018> (Last accessed on 14 November 2019).

123 Global Chemicals Outlook Synthesis Report: From Legacies to Innovative Solutions – Implementing the 2030 Agenda for Sustainable Development, Available at: <http://www.saicm.org/portals/12/documents/meetings/oewg3/inf/oewg3-inf-19-gcoii-summary.pdf> (Last accessed on 14 November, 2019).

124 *Ibid.*

125 Available at: <http://www.saicm.org/implementation/emergingpolicyissues/hazardouselectricals/tabid/5474/language/en-us/default.aspx> (Last accessed on 14 November 2019).

International Environmental Technology Centre on this issue.¹²⁶ Global Action Plan on HSLEEP was endorsed by ICCM3 and it included areas such as e-products green design, environmentally sound manufacturing of e-products and aware-raising.¹²⁷ The parties at ICCM3 also agreed to continue the work of identification, compilation and creation of an international set of best practice resources in this area.¹²⁸ An International Workshop on HSLEEP was held in Vienna from 29 to 31 March 2011 and the stakeholders at ICCM4 were encouraged to disseminate the Report of this workshop¹²⁹ and were also encouraged to consider the recommendations and key messages emerging from the workshop.¹³⁰ HSLEEP substances included lead, mercury, cadmium, zinc, yttrium, chromium, beryllium, nickel, brominated flame-retardants, antimony trioxide, halogenated flame-retardants, tin, polyvinyl chloride (PVC) and phthalates.¹³¹

India and HSLEEP: As per a toxic link Report India's rate of personal computers obsolescence is rising very dangerously.¹³² As per the Report, the major sources of e-waste are departments of government, the public and private sectors, retailers, individual households, foreign embassies, PC manufacturing units, the secondary market and imported scrap.¹³³ To tackle the issue and implement HSLEEP India introduced the E-Waste (management) Rules 2016 which replaced the earlier E-Waste (Management) and Handling Rules, 2011.¹³⁴

126 *Ibid.*

127 *Ibid.*

128 *Ibid.*

129 The Report of the Workshop is Available at: http://www.saicm.org/portals/12/documents/epi/report%20e-waste%20workshop_vienna.pdf (Last accessed on 14 November, 2019).

130 The recommendations and key messages of the workshop are carefully listed in detail in the report, *Ibid.* See the report of the workshop for the list of recommendations and key messages emerging from the workshop.

131 Available at: http://addis.unep.org/projectdatabases/01571/project_general_info (Last accessed on 14 November 2019).

132 Toxic Links, E-waste in India- System Failure imminent -Take Action Now! Available at: http://toxicslink.org/docs/06040_repsumry.pdf (Last accessed on 14 November 2019).

133 *Ibid.*

134 Available at: <https://www.downtoearth.org.in/blog/waste/e-waste-day-82-of-india-s-e-waste-is-personal-devices-61880> (Last accessed on 14 November 2019).

4. Endocrine Disrupting Chemicals: Endocrine Disrupting Chemicals (EDCs) are chemicals or mixtures of chemicals that interfere with normal hormonal action and cause adverse effects.¹³⁵ They include a number of PoPs such as PCB and DDT. They can cause disorders such as infertility and growth related disorders in both human and animals.¹³⁶ Under SAICM, EDCs are listed as one of the 8 emerging issue¹³⁷ and the ICCM has recognised their adverse effects on human and environment both.¹³⁸ Since 2012 the actions in this area are led by the OECD, UNEP and WHO.¹³⁹ The WHO and UNEP Report titled *State of the Science of Endocrine Disrupting Chemicals 2012*¹⁴⁰ as part of their collaboration seeks to addresses the concerns about the potential adverse effects of anthropogenic chemicals and is referred by the SAICM to all the stakeholders.

India and EDCs: There is no specific policy and regulation dealing of EDCs in India. However, a team of Indian Scientists have developed a comprehensive database of EDCs.¹⁴¹ The database is a comprehensive catalogue of research that focused on the impact of these chemicals on health. This database will not only help to raise public awareness but will also the regulatory agencies, health authorities and industry to tackle the menace of EDCs.¹⁴² India also prepared a discussion paper on the Uniform Risk Management approach to address the issue

135 Available at:http://addis.unep.org/projectdatabases/01571/project_general_info (Last accessed on 14 November, 2019).

136 *Ibid.*

137 Available at:<http://www.saicm.org/implementation/emergingpolicyissues> (Last accessed on 14 November, 2019).

138 *Ibid.*

139 *Ibid.*

140 This Report is available at:<http://wedocs.unep.org/bitstream/handle/20.500.11822/12223/state%20of%20the%20science%20of%20edcs%20summary%20report%202012.pdf?sequence=1&isallowed=y> (Last accessed on 14 November 2019).

141 Available at: <https://vigyanprasargov.in/isw/indian-scientists-develop-database-of-everyday-chemicals-harmful-to-human-health.html> (Last accessed on 14 November 2019).

142 *Ibid.*

of Endocrine Disrupting chemicals in Food¹⁴³ at the 50th Session of Joint FAO/WHO Food Standards Programme Codex Committee on Pesticide Residue with the objective to develop internationally acceptable definition of EDCs in the context of food safety and to develop risk based guidelines to deal with their presence in food products.¹⁴⁴

- 5. Environmentally Persistent Pharmaceutical Pollutants:** Environmentally persistent pharmaceutical pollutant were adopted as an emerging policy issue under SAICM during the ICCM4.¹⁴⁵ Relevancy and need of information dissemination and awareness-raising on EPPPs was highlighted and improvement in the availability and access to this information was made a priority at ICCM4.¹⁴⁶

EPPPs and India: India is known as the pharmacy of the world due to its vibrant generic pharma industry. Thus, making it highly vulnerable to extreme example of drug pollution. One such case was found in India in 2009 in an area where pharmaceutical manufacturing activity is concentrated. It was found that The water quality monitoring for the year 1995-2009 which is regularly conducted by the Central Pollution Control Board indicated that organic, inorganic and bacterial contamination was critical in the water bodies of India. The main cause of water contamination was determined to be the mixing of domestic and industrial wastewater in the environment. This release of wastewater in the environment was done without passing the same through treatment plants.¹⁴⁷ Further, a research conducted found very high concentration of pharmaceutical

143 The discussion paper is available at: http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en?lnk=1&url=https%253a%252f%252fworkspace.fao.org%252fsites%252fcodex%252fmeetings%252fcx-718-50%252fcrds%252fpr50_crd18x.pdf (Last accessed on 14 November 2019).

144 *Ibid.*

145 Available at: <http://www.saicm.org/implementation/emergingpolicyissues/pharmaceuticalpollutants/tabid/5477/language/en-us/default.aspx> (Last accessed on 14 November 2019).

146 *Ibid.*

147 Available at: <https://www.omicsonline.org/pharmaceutical-substances-in-india-are-a-point-of-great-concern-2157-7587.1000e103.php?aid=9042> (Last accessed on 14 November 2019).

drugs in drains, sewerages and rivers.¹⁴⁸ Taking into account, and also the objective of SAICAM regulatory agencies (Central Drugs Standard Control Organization (CDSCO) and National Pharmaceutical Pricing Authority (NPPA) and Water Act) in India need to frame stringent regulations to tackle the issue.

3.8.6 INDIA & MERCURY

India does not mine mercury but procures it through imports for meeting its requirements. India is called a Mercury hotspot as it is one of the biggest consumers of mercury across the globe.¹⁴⁹ The imported mercury is utilized in various industrial activities, it is however primarily used in thermometers and other measuring devices, electronics, dentistry, batteries, lighting equipment, thermostat switches fungicides, paints, cosmetics, drugs, pharmaceutical products, traditional uses in Ayurveda and Siddha medicine and chlor-alkali industry.¹⁵⁰ Thus, even though mining of mercury does not occur domestically, India still consumes mercury in significant quantities through imports. This consumption results in generation of mercury laden waste and mercury emissions into the environment. Besides that, Indian emission of mercury also occurs through coal fired thermal power plants.¹⁵¹

In India, mercury wastes are dealt with under the Hazardous Waste Management Rules, 2016¹⁵², in accordance with the provisions of the Basel Convention. At present, India does not have any specific legislation to deal with management of mercury wastes. However there are technical guidelines developed by the Central Pollution Control Board (CPCB)

148 *Ibid.*

149 Nidhi Jamwal, *India a Mercury Hotspot*, Available at: <https://www.downtoearth.org.in/news/india-a-mercury-hotspot-13770> (Last accessed on 6 November, 2019).

150 *Technical Background Report to the Global Atmospheric Mercury Assessment*, AMAP & UNEP, 2008 (As cited in JaminaKYpto, *supra*).

151 *Ibid.*; See also Mercury Free India by Toxic Links, for a detailed study of mercury in India and Minamata Convention and its application in India.

152 Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9iv01funvszxfmjaxni5wzgy=> (Last accessed on May 11, 2019).

in order to deal with mercury wastes generated by health-care facilities¹⁵³. A draft of these guidelines was prepared in 2010 and they were finally adopted in 2012. These guidelines aim to reduce the risk posed by mercury wastes disposed by hospitals and other health care providers by mandating certain norms for their safe and responsible disposal. They also aim to reduce the dependence of health-care providers on devices and instruments that include mercury as one of their main constituents.

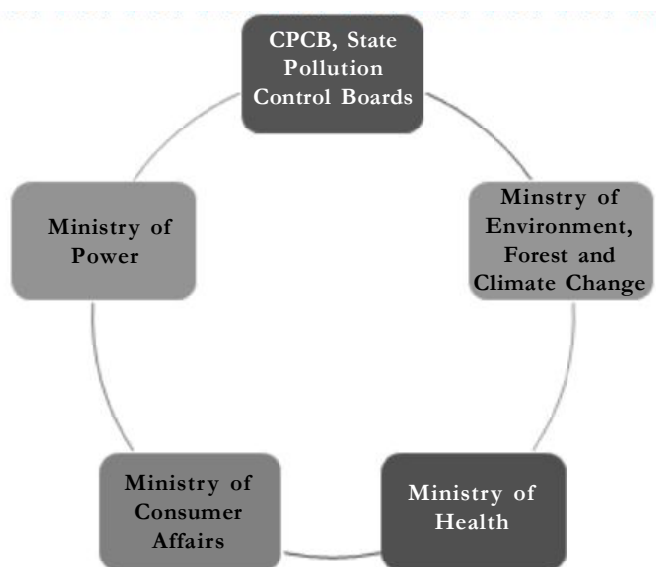
However, as already mentioned, other than these guidelines, the legislations for specifically dealing with mercury wastes in India are almost non-existent. This is in stark contrast to the situation in several European and even Asian countries, where the use of mercury in most regular activities that pose the greatest danger to the general public has been totally banned. For instance, in China, there is a complete ban on the use of mercury in the production or as a constituent of household products, with no such corollary existing in India. Thus, the enforcement of rules regarding mercury pollution in India is relatively weak. This situation must be improved by the introduction of specific legislations that deal with mercury waste in different circumstances, so as to improve implementation by reducing the vagueness and inconsequentiality of the current legislative scheme.¹⁵⁴

IMMI (Improvement of Mercury Management in India) is a project being implemented by UNDP for the Ministry of Environment, Forest and Climate change, and funded by the Global Environment Facility (GEF). The aim of the project is to develop a national mercury profile by undertaking a comprehensive inventory of mercury including significant sources of emissions and releases. It also included assessment of legal, policy, regulatory, technical and financial needs and gaps that need to be addressed by India to meet the obligations of the Minamata Convention on Mercury. It also conducts awareness workshops for various stakeholders on impacts of mercury on human health

153 Environmentally Sound Management of Mercury Waste Generated from the Health Care Facilities, http://cpcb.nic.in/uploads/hwmd/guidelines_for_esm_mercuryw_fromhcfs.pdf (Last accessed on May 13, 2019).

154 R. C. Srivastava, *Guidance and Awareness Raising Materials under New UNEP Mercury Programs (Indian Scenario)*, Available at: <http://www.indiaenvironmentportal.org.in/files/file/india-submission.pdf> (Last accessed on May 13, 2019).

and the environment.¹⁵⁵ India approved ratification of Minamata convention along with the flexibility for continued use of mercury-based products and processes involving mercury compounds till 2025.



ORGANIZATIONS CRITICAL FOR THE IMPLEMENTATION OF THE MINAMATA CONVENTION IN INDIA

Major Consumers of Mercury in India

Mercury Consumers	Consumers	Amount (estimated through primary study) (tons/annum)
Elemental Mercury	Clinical thermometer	21.82
	Blood pressure	
Elemental Mercury/ Mercury Oxides	Dental amalgams	65
	Compact fluorescent lamps	8.5
Mercury	Chlor-alkali industries in 2013	2.96
Total		98.28

155 Available at: <https://www.in.undp.org/content/india/en/home/climate-and-disaster-resilience/successstories/press-release—two-day-workshop-on-minamata-convention-and-inven.html> (Last accessed on 6 November, 2019).

3.9 MATRIX OF INTERNATIONAL LAW ON MANAGEMENT OF HAZARDOUS WASTES AND CHEMICALS

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1992	
Summary	<p>The Basel Convention was adopted in response to the realization in the eighties that many least developed countries had become a dumping site for hazardous wastes imported from developed countries. The Convention was opened for signature on 22 March 1989, and entered into force on 5 May 1992. As of October 2018, 186 states and the European Union are parties to the Convention. In its Preamble, the Convention sets forth that reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes are of utmost priority. Having said that, wherever there is no option but to carry out transboundary movement of such wastes, the same should be done according to the regulatory system established in this Convention. There is a duty imposed on the waste generator to be responsible for transportation and disposal of hazardous wastes and the State of import has the sovereign right to ban such entry or disposal in its territory.¹⁵⁶ The Convention also talks about establishing proper measures for exchange of information on and control of the transboundary movement of hazardous wastes and the Secretariat under the Convention is designated to be Clearing House for this purpose.¹⁵⁷ Signatory Parties to this Convention have to designate competent authority¹⁵⁸ and focal point¹⁵⁹ of this Convention. Cooperation between parties is mandated¹⁶⁰, ranging from exchange</p>

156 Available at: <https://www.basel.int/portals/4/basel%20convention/docs/text/baselconventiontext-e.pdf> (Last accessed on November 10, 2019).

157 Article 16, Basel Convention.

158 *Ibid* Article 6.

159 *Ibid* Article 5.

160 *Ibid* Articles 10 & 13.

	<p>of information on issues relevant to Convention to technical assistance, particularly to developing countries. Regional or sub-regional centres for training and technology transfers regarding the management of hazardous wastes and the minimization of their generation shall be set up.¹⁶¹ According to this Convention, hazardous and other wastes are those covered under Annex I, II and III of the Convention and those considered as hazardous under domestic legislation of the Party of export, import or transit. Radioactive waste and waste generated during the normal operation of a ship are exempted from this Convention, since there are separate conventions on the same. Based on the concept of prior informed consent, it requires that, before an export may take place, State of export authorities notify the prospective States of import and transit authorities, providing them with detailed information on the intended movement. The movement may only proceed if and when all States concerned have given their written consent.¹⁶² Pursuant to the coming of the Convention, a Protocol on Liability and Compensation for Damage resulting from Transboundary Movements of Hazardous Wastes and their Disposal, has also been introduced. In the event that the contract for a transboundary movement of hazardous wastes could not be carried out for some reason or is coming within the meaning of illegal traffic, Convention attributes responsibility to one or more of the States involved, and imposes the duty to ensure re-import¹⁶³. Parties may enter into bilateral or multilateral agreements on hazardous waste management with other parties or with non-parties, provided that such agreements are “no less environmentally sound” than this Convention.¹⁶⁴</p>
--	---

161 *Ibid* Article 14.

162 *Ibid* Articles 6 & 7.

163 *Ibid* Articles 8 & 9.

164 *Ibid* Article 11.

	<p>A protocol setting out appropriate rules and procedures in the case of liability and compensation for damage resulting from transboundary movement and disposal of hazardous wastes, to be put in place by parties.¹⁶⁵After the initial adoption of the Convention, some least developed countries and environmental organizations were concerned that all kinds of wastes could be exported to least developed countries under the guise of recycling which can only be avoided through a complete ban. This led to the adoption of an amendment to the convention in 1995 termed the Basel Ban Amendment which prohibits the export of hazardous waste from a list of developed (mostly OECD) countries to developing countries. The amendment has been accepted by 95 countries¹⁶⁶ and the European Union, but has not entered into force as that requires ratification by 3/4 of the member states to the Convention. As per Art. 12, the Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal Basel was introduced on 10th December, 1999 which has been signed by 13 parties.</p>
Indian ratification status/ treaty obligations	<p>India signed the Convention on 15th March, 1990, ratified the same on 24th June, 1992 and it finally came into force in India on 22nd September, 1992. It has not ratified the Basel Ban or the 1999 Protocol till now. According to Article 4, India as a Party has the following obligations:</p> <ul style="list-style-type: none">- Minimum generation of hazardous wastes and other wastes;- Availability of environmentally sound disposal facilities at place of disposal;

165 *Ibid* Article 12.

166 Primary data, Available at: <http://www.basel.int/countries/statusofratifications/banamendment/tabid/1344/default.aspx> (Last accessed on November, 2019).

	<ul style="list-style-type: none"> - Persons involved in hazardous waste management prevent pollution and its consequences; - Transboundary movement of hazardous wastes is reduced to a minimum; - To not allow export of hazardous waste into developing countries that have prohibited such imports; - Information about proposed transboundary movement of such wastes to be provided to States concerned; - Prevent import if wastes in question will not be managed in an environmentally sound manner; - Co-operate in activities with other Parties and interested organizations, directly and through the Secretariat; - Consideration that illegal traffic in hazardous wastes is criminal; - Appropriate legal, administrative and other measures to implement and enforce provisions of this Convention including punishment for contravention; - No export or import deals between a Party and a non-Party; - No export for disposal within the area south of 60° South latitude; - Prohibit unauthorised transport or disposal of such wastes within its national jurisdiction; - Such wastes to be packaged, labelled and transported in conformity with international rules and standards and best practices; and - Wastes to be accompanied by a movement document from the commencement point of transboundary movement <ul style="list-style-type: none"> ● Transboundary movement to be allowed only if; ● State of export does not have the technical capacity or facilities for disposal;
--	---

	<ul style="list-style-type: none"> • State of import requires such waste for recycling or recovery industries; • Movement is in accordance with criteria set by Parties; <p>India is also actively involved in the work relating to preparation of technical guidelines for environmentally sound management of shipbreaking along with Norway and the Netherlands under this convention.</p>
Domestic application	<p>First comprehensive rules on hazardous waste management were brought about in July 1989 through the Hazardous Waste (Management and Handling) Rules 1989 but these rules suffered from some limitations. After becoming a party to the Basel Convention, the Rules were amended in 2000, 2003 and a final notification of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 in supersession of former notification was brought about. These Rules were again superseded by Rules of 2016. The Rules lay down corresponding duties of various authorities such as Ministry of Environment, Forests and Climate Change (MoEF&CC), Central Pollution Control Board (CPCB), State/Union Territory governments, State Pollution Control Boards (SPCB)/Pollution Control Committees (PCC), Directorate General of Foreign Trade (DGFT), Port Authority and Custom Authority while SPCBs/ PCCs have been designated with wider responsibilities touching across almost every aspect of Hazardous wastes generation, handing and their disposal.</p> <p>'Hazardous waste' is defined as any waste which by virtue of its physical or other characteristics (described as chemical, toxic, inflammable, reactive, explosive, etc.) causes or can cause danger to health or environment, either standalone or in combination with other substances.¹⁶⁷ A list of processes generating hazardous waste is</p>

¹⁶⁷ Rule 3 (1) (17), Hazardous Waste Management Rules, 2016.

	<p>identified which inter-alia includes industries engaged in petrochemicals, oil & gas, petroleum, mines and minerals, zinc, copper, lead based production, textiles, steel, asbestos, electronic, tannery, etc.¹⁶⁸ Every occupier of a factory is required to obtain authorization from SPCB, and will be responsible for safe and environmentally sound handling of hazardous wastes generated in the establishment. As such it is mandated that every occupier must (i) sell hazardous waste only to an authorised actual user, (ii) transport such waste in the manner prescribed, (iii) provide specific information on safe storage and disposal, and (iv) prevent accidents and increase awareness.¹⁶⁹ Further, the occupier has to file annual returns and maintain records regarding generation of hazardous waste in prescribed forms. There is also a checklist in place for occupiers to follow, for the import/export of hazardous and other wastes. These wastes include lead scrap/batteries scrap, waste tyres/rubber scraps, electrical and electronic assemblies for repair/renting/ testing purpose/ projects/ R&D/ re-use of medical equipment/ refurbished spare parts or components, used oil or any other wastes excluding those listed above.</p> <p>Hazardous Substances Management Division (HSMD) is the nodal point for the Basel Convention. Following policy initiatives have been started by this Division:</p> <ul style="list-style-type: none"> - A project on GIS Based National Hazardous Waste Information System which is a web based system, developed to provide status of hazardous waste management in the Country. The database available on the web is required to be regularly updated by all State Pollution Control Boards to ensure updated status at all times. Through NHWIS till now survey of 33,000
--	---

168 *Ibid* Schedule I.

169 *Ibid* Rule 4.

	<p>hazardous waste industries and MIS date entry of about 27,500 hazardous waste industries has been completed.</p> <ul style="list-style-type: none"> - By preparing a National Inventory of Hazardous Wastes: As per information provided by the Central Pollution Control Board (CPCB), there are about 41,523 industries in the country generating about 7.90 million tonnes of hazardous waste annually, out of which landfillable waste is about 3.32 million tonnes (42.02%), incinerable waste is about 0.60 million tonnes (7.60%) and recyclable hazardous waste is about 3.98 million tonnes (50.38%).¹⁷⁰ - At present, Treatment, Storage and Disposal Facilities (TSDFs) for hazardous wastes including Integrated TSDF, 13 Exclusive Common Secure Landfills and Exclusive Common Incinerators are available in 10,9 and 4 States/UT respectively. - In Basel Convention COP 14, 2019, two important issues were discussed and decided, i.e. technical guidelines on e-waste and inclusion of plastic waste in the PIC procedure. - Opened negotiations and corrections in the interim technical guidelines on e-waste and strengthened India's global commitment towards phasing out single use plastic.¹⁷¹ <p>Apart from the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, the Batteries (Management and Handling) Rules, 2001, E-waste (Management and Handling) Rules, 2016 and Plastic Waste (Management and Handling) Rules, 2016 have also been promulgated to handle management and disposal of batteries, e-waste and plastic waste, respectively. There are also the Guidelines for Environmentally Sound Management of E-Waste.</p>
--	--

170 Available at: <http://moef.gov.in/environment/waste-management/> (Last accessed on November 19, 2019).

171 Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=190019> (Last accessed on November 19, 2019).

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 2004

Summary	<p>There has been a growing concern amidst increased production of chemicals and potential risks posed by hazardous chemicals and pesticides. Consequently the Food and Agricultural Cooperation and United Nations Environment program introduced the Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals in International Trade for signature in 1998 and the Convention came into force in 2004. There are 161 parties to this Convention as of 2018.¹⁷²</p> <p>Its two main objectives are as follows:</p> <ul style="list-style-type: none">- to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm;- to contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties. <p>Convention begins with defining the various kinds of categories of chemicals such as 'banned chemical', 'severely restricted chemical' and 'severely hazardous chemical formulation'.¹⁷³ The procedures to include such chemicals within the requirements of prior informed consent (PIC) are prescribed as well.¹⁷⁴</p>
----------------	--

172 Available at: <http://www.pic.int/countries/statusofratifications/tabid/1072/language/en-us/default.aspx> (Last accessed on November 19, 2019).

173 Article 2, Rotterdam Convention.

174 *Ibid* Articles 5-9.

	<p>Each Party needs to have a designated national authority (DNA) responsible for implementation of this Convention. Other key agencies here are the Chemical Review Committee (CRC) and Conference of the Parties (COP). The CRC reviews notifications of final regulatory actions and proposals from Parties and makes recommendations to COP on the addition of chemicals to Annex III.</p> <p>Parties are empowered to make informed decisions about the chemicals they wish to import and those that they refuse to. The PIC procedure is the mechanism for formally obtaining and disseminating the decisions of importing Parties, as to whether they wish to receive future shipments of those chemicals listed in Annex III of the Convention and for ensuring compliance with these decisions by exporting Parties. As of now, a total of 50 chemicals are listed in Annex III, 34 pesticides (including 3 severely hazardous pesticide formulations), 15 industrial chemicals, and 1 chemical in both the pesticide and the industrial chemical categories.¹⁷⁵</p> <p>Annexes under the Convention include information requirements for notifications made pursuant to Article 5; criteria for listing banned or severely restricted chemicals in Annex III; chemicals subject to the PIC procedure; information and criteria for listing severely hazardous pesticide formulations in Annex III; information requirements for export notification; procedure for settlement of disputes.</p> <p>At its 7th COP, CRC decided to recommend the following chemicals to be added in Annex III to the Convention:</p> <ul style="list-style-type: none">- Chrysotile asbestos
--	---

¹⁷⁵ Available at: <http://www.pic.int/theconvention/chemicals/annexiiichemicals/tabid/1132/language/en-us/default.aspx> (Last accessed on November 19, 2019).

	<ul style="list-style-type: none"> - Fenthion (ultra low volume (ULV) formulations at or above 640 g active ingredient/L) - Liquid formulations (emulsifiable concentrate and soluble concentrate) containing paraquat dichloride at or above 276 g/L, corresponding to paraquat ion at or above 200 g/L - Trichlorfon
Indian ratification status/treaty obligations	<p>India ratified the Convention on 24th May, 2005 and it came into force in India from 22nd August, 2005. Its obligations are as follows:</p> <ul style="list-style-type: none"> - Power to decide whether to allow or ban the importation of chemicals listed in the treaty. - In case of exports, it should make sure that producers within their jurisdiction comply. <p>In 2017, India opposed the listing of Chrysotile asbestos as a hazardous substance under the Rotterdam convention at the 8th COP that was conducted in Geneva.¹⁷⁶</p> <p>India is also the member of CRC for the period of 2016- 2020.</p>
Domestic application	<p>HSMD is the nodal point for the Rotterdam Convention with the primary objective of safe management and use of hazardous substances including hazardous chemicals, in order to avoid damage to health and environment. DNAs include Department of Chemicals and Petrochemicals and Department of Agriculture, Cooperation and Farmers' Welfare.</p> <p>Broadly production, use, import and export, packing, storage, transportation of pesticides and Industrial Chemicals and Chemicals</p>

176 Available at: <https://www.hindustantimes.com/india-news/chrysotile-asbestos-not-hazardous-says-india-under-rotterdam-convention/story-qfmwglmaryhboh4e4atspo.html> (Last accessed on November 19, 2019).

	<p>Wastes are regulated and managed in India under the following Acts/ Rules:</p> <ul style="list-style-type: none"> - The Insecticides Act, 1968, The Insecticides Rules, 1971, The Manufacture Storage and Import of Hazardous Chemicals Rules, 1989, The Water Act, 1974, The Air Act, 1981, The Environment (Protection) Act, 1986, The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, The Public Liability Insurance Act, 1991, The Public Liability Insurance Rules, 1991, The Environmental Impact Assessment Notifications, 2006 and The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2016. <p>Some of the policy initiatives taken for ensuring chemical safety in the country, as well as for implementing the Convention are as follows:</p> <ul style="list-style-type: none"> - A comprehensive National Chemical Profile assessing the existing institutional, administrative, technical and legal infrastructure vis-a-vis the requirements of safe handling of chemicals in the country is being prepared. - As on date, there is 1729 Major Accident Hazard Units (MAH) in 22 States / UTs (19 states and 3 UTs). As per the latest information, 1569 on-site Plans and 137 Off-site plans have been prepared. All the states except Bihar and Jammu & Kashmir have constituted State Level Crisis Groups. - A GIS based Emergency Planning and Response System has been developed for 20 districts clusters in Gujarat, Maharashtra, Tamil Nadu and Andhra Pradesh and extended to cover another 22 districts in the 10 states of NCT- Delhi, Assam, Haryana, West Bengal, Madhya Pradesh, Uttar Pradesh, Karnataka, Punjab, Rajasthan and Kerala.
--	--

	<ul style="list-style-type: none"> - Out of 270 districts having MAH Units, 180 have hazard prone industrial pockets. Hazard Analysis studies have been initiated for 107 districts - An inventORIZATION study on "Isolated Storages" carried out during 2001-02 has identified 347 Isolated Storages in the country. - As per COP 9, under the Rotterdam Convention, two new chemicals (Phorate and HBCD) were added in the list for mandatory PIC procedure in international trade.
Stockholm Convention on Persistent Organic Pollutants, 2004	
Summary	<p>Exposure to Persistent Organic Pollutants (POPs) which remain intact in the environment for long periods and over large geographical areas, can lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and damages to the central and peripheral nervous systems. Realising the global scale at which such pollutants spread, the UNEP called for global action to be taken on POPs. Convention was introduced in 22nd May 2001 and came into force on 17th May, 2004, with 182 parties so far.</p> <p>The Convention seeks an initial twelve chemicals for restriction or elimination of the production and releases which include organochlorine pesticides, (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene,) industrial chemicals (polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB)) and unintentionally produced chemicals (polychlorinated dibenzo dioxins/ polychlorinated dibenzo furans (PCDD/PCDF), PCBs and HCBs)).</p> <p>Under the Convention, the chemicals can be listed for complete elimination from production, use, export and import (Annex-A), restriction in use and production for specific purpose only</p>

	<p>(Annex-B) or unintentional production (Annex-C). The implementation of the Convention requires the parties to take measures to eliminate or reduce the release of these POPs into the environment. Till date, 26 chemicals are listed as POPs under the Stockholm Convention. Other Annexes include information requirement and screening criteria; information requirement for the risk profile; information on socio-economic considerations; and arbitration and conciliation procedures for settlement of disputes.</p> <p>Other provisions of the Convention relate to the development of implementation plans¹⁷⁷, information exchange,¹⁷⁸ public information, awareness and education¹⁷⁹ (Article 10)¹⁸¹, research, development and monitoring,¹⁸⁰ technical assistance¹⁸¹, financial resources and mechanisms¹⁸², reporting¹⁸³, effectiveness evaluation¹⁸⁴ and non-compliance¹⁸⁵.</p> <p>Persistent Organic Pollutants Review Committee (POPRC) was established in 2005 to identify additional POPs and the criteria to be considered in doing so.</p>
Indian ratification status/ treaty obligations	<p>India actively participated in the International Negotiation Committee (INC) meetings leading to the drafting and acceptance of the Stockholm Convention and it ratified the same on 13th January, 2006.</p>

177 Article 7, Stockholm Convention.

178 *Ibid* Article 9.

179 *Ibid* Article 10.

180 *Ibid* Article 11.

181 *Ibid* Article 12.

182 *Ibid* Article 13.

183 *Ibid* Article 15.

184 *Ibid* Article 16.

185 *Ibid* Article 17.

	<p>India's obligations under this Convention include:</p> <ul style="list-style-type: none"> - Prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex A to the Convention.¹⁸⁶ - Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention.¹⁸⁷ - Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention.¹⁸⁸ - Ensure that stockpiles and wastes consisting of, containing or contaminated with POPs are managed safely and in an environmentally sound manner.¹⁸⁹ - To target additional POPs.¹⁹⁰ <p>India has membership of POPRC from 2018-2022.</p>
Domestic application	<p>HSMD is the nodal point for the Stockholm Convention. Designated national authorities are in Ministry of Agriculture and Cooperation and Ministry of Chemicals and Petrochemicals.</p> <p>Broadly production, use, import and export, packing, storage, transportation of pesticides and Industrial Chemicals and Chemicals Wastes related to POP chemicals are regulated and managed in India under the following Acts/ Rules:</p> <ul style="list-style-type: none"> - Explosives Act, 1884, Indian Ports Act, 1908, Petroleum Act, 1934, Factories Act, 1948, Mines Act, 1952, Merchant

186 *Ibid* Article 3.

187 *Ibid*.

188 Article 5, Stockholm Convention.

189 *Ibid* Article 6.

190 *Ibid* Article 8.

	<p>Shipping Act, 1958, Customs Act, 1962, Insecticides Act, 1968, Insecticides Rules, 1971, Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Static and Mobile Pressure Vessels (Unfired) Rules, 1981, Fertilizer (Control) Order, 1985 under the Essential Commodities Act, 1955, Calcium Carbide Rules, 1987, Manufacture Storage and Import of Hazardous Chemicals Rules, 1989, Central Motor Vehicles Rules, 1989, Environment (Protection) Act, 1986, Public Liability Insurance Act, 1991, Public Liability Insurance Rules, 1991, Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, Ozone Depleting Substances (Regulation and Control) Rules, 2000, Gas Cylinder Rules, 2004, Environmental Impact Assessment Notifications, 2006 and Hazardous Wastes (Management , Handling and Transboundary Movement) Rules, 2016.</p> <p>The NIP for India has been developed through Global Environment Facility (GEF) funding. MoEF&CC serves as the focal point for GEF and Stockholm Convention in the country. For the development of the NIP, the MoEF worked closely with the CPCB, Ministry of Agriculture (MoA), Ministry of Chemicals and Fertilizers (MoCF), Ministry of Power, Ministry of Health and Family Welfare (MoH&FW) and Ministry of Science & Technology (MST). In accordance with the Convention requirements, India would review and update the NIP according to the timeframe given by the COP. Indian government has the following strategies for implementation of the NIP:</p> <ul style="list-style-type: none"> - Environmentally Sound Management and Final Disposal of PCB - Environmentally Sound Management of Medical Wastes
--	--

	<ul style="list-style-type: none"> - Development and promotion of non POPs alternatives to DDT - Implementation of the Best Available Technology (BAT)/ Best Environmental Practices (BEP) strategies for elimination / reduction of unintentional POPs emissions of the priority industry sectors identified in the NIP of India - Management of PVC plastic waste to avoid incineration / dumping the landfill for preventing releases of Dioxins and Furans due to burning - Capacity building, demonstration of production and promotion of bio-botanical neem derived bio-pesticides as viable, eco-friendly, bio-degradable alternatives to POPs pesticides - Identification of sites contaminated by POPs chemicals and of remediation process at the potential hotspots - POPs and pesticides management in India - Inventorization of newly listed POPs - National POPs monitoring India program and - Strengthening institutions and capacity building for effective and efficient implementation of the NIP in India. - Under the Stockholm Convention the COP14, 2019 decided to list “Dicofol” in Annex A without any exemption. The “PFOA” was also listed with some exemptions in the Annex A of the Stockholm Convention. <p>India has ratified the 12 initially listed chemicals.</p>
--	--

Minamata Convention on Mercury, 2017	
Summary	<p>The toxicity of mercury and mercury compounds and their adverse effect on human health and the environment have been known for a long time. However, the enormous public health crises which were caused due to mercury poisoning, such as Minamata disease and Niigata Minamata disease, brought the issue to the limelight. In February 2009, the Governing Council of UNEP called for the development of a global legally binding instrument on mercury. On 10th October, 2013, the Minamata Convention on Mercury, a global treaty to protect human health and the environment from the adverse effects of mercury, was formally adopted and opened for signature by States and regional economic integration organizations. The Convention has 101 parties and entered into force on 16th August, 2017.</p> <p>Apart from referring to mercury as a chemical of global concern and wide spread diseases such as the Minamata disease, Preamble to the Convention talks about the importance of financial, technical, and technological and capacity building support, particularly for developing countries and countries with economies in transition and the role that multilateral agencies and agreements have in this respect.</p> <p>Operational part of the Convention discusses phasing out of primary mercury mining, restrictions on import or export of mercury without written consent, discouraging new mercury-added products, unless there are environmental or human health benefits, restricting manufacturing processes in which mercury or mercury compounds are used and eliminate use of mercury in artisanal and small-scale gold mining. Any State or regional economic integration organization may register for an exemption, provided that there is a statement providing reasons for the same.¹⁹¹ Articles 8 and 9 prescribe maximum</p>

191 Article 6, Minamata Convention.

	<p>permissible limits on mercury emissions and release of such compounds to land and water.</p> <p>Financial support to Parties in implementing the Convention would be provided through GEF and through a specific international programme (SiP) which will support “<i>capacity building and technical assistance</i>.”¹⁹² Information and awareness sharing provisions include health aspects, information exchange, public information, awareness and education, research, development and monitoring, implementation plans, reporting and effectiveness evaluation.¹⁹³</p> <p>Annexures include lists of mercury-added products, manufacturing processes in which mercury or mercury compounds are used, detailed strategy to handle artisanal and small-scale gold mining, list of point sources of emissions of mercury and mercury compounds to the atmosphere and arbitration and conciliation procedures.</p>
Indian ratification status/ treaty obligations	<p>India signed the Convention on 30th September 2014 and ratified on 18th June, 2018 becoming the 93rd member of the Convention. The ratification entails flexibility for continued use of mercury-based products and processes involving mercury.</p> <p>India's obligations under the Convention:</p> <ul style="list-style-type: none"> - Not grant permission for fresh projects on primary mercury mining after the coming into force of this Convention and allow existing projects to continue for only a period of 15 years from the date of Convention. - Mercury from such mining to be used only in manufacturing of mercury-added products,¹⁹⁴ in manufacturing processes¹⁹⁵

192 Ibid Article 13.

193 Ibid Articles 16-22.

194 Ibid Article 4.

195 Ibid Article 5.

	<p>and disposed only using operations which do not lead to recovery, recycling, reclamation, direct re-use or alternative uses.¹⁹⁶</p> <ul style="list-style-type: none"> - Identify individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks exceeding 10 metric tons per year. - Ensure that, where the Party determines that excess mercury from the decommissioning of chlor-alkali facilities is available, such mercury is disposed of in accordance with Article 11. - Allow export of mercury only after written consent from country of import provided that it's for a use allowed under this Convention or is to be stored on an interim basis in an environmentally sound manner - Setting out measures which will either phase out or will restrict such existing manufacturing processes as are referred to, in Article 5. - Initiating steps that will lead to reduction in the usage of mercury and its compounds in activities such as gold mining and processing, and wherever feasible eliminating the usage of mercury and its compounds in mining and processing activities, and also the environmental emissions and releases of mercury from the aforementioned activities.¹⁹⁷ - Develop and implement national action plan - Identification of the relevant “point source categories” of mercurial releases into land and water within a time line of
--	--

¹⁹⁶ *Ibid* Article 11.

¹⁹⁷ *Ibid* Article 7.

	<p>three years after of date of entry into force of the Convention.¹⁹⁸</p> <ul style="list-style-type: none"> - Develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds.¹⁹⁹ <p>Parties are also encouraged to:</p> <ul style="list-style-type: none"> - Identify and protect populations at risk - Promote education and prevention programmes - Promote appropriate health care services - Establish and strengthen Institutional and health professional capacities <p>India has registered exemption under Article 6 from application of Convention provisions to items mentioned below due to lack of information on mercury use and dearth of techno-economic feasible alternative:²⁰⁰</p> <ul style="list-style-type: none"> - Batteries, except for button zinc silver oxide batteries with a mercury content < 2% and button zinc air batteries with a mercury content < 2% - Switches and relays, high frequency radio frequency switches and - Compact fluorescent lamps (CFLs) for general lighting purpose less than 30 watts - Linear fluorescent lamps (LFLs) for general lighting purpose
--	--

198 *Ibid* Article 9.

199 *Ibid* Article 12.

200 Available at: <http://www.mercuryconvention.org/portals/11/documents/notifications/india%20exemptions.pdf> (Last accessed on November 19, 2019).

	<ul style="list-style-type: none"> - High pressure mercury vapour lamps for general lighting purpose - Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays - Cosmetics (with mercury content above 1ppm) - Pesticides, biocides and topical antiseptics - Non-electronic measuring devices such as barometers, hygrometers, manometers, thermometers and sphygmomanometers
Domestic application	<p>The National Focal Point of India to the Minamata Convention is the HSMD.²⁰¹</p> <p>The country currently has no policy to regulate and control mercury emissions.</p> <p>The MoEF&CC and the UNDP, under the GEF project on Improvement of Mercury Management in India, organized a Workshop on “Two-day Workshop on “Minamata Convention and Inventorisation of Mercury in India” in Indian Institute of Technology (IIT) Madras during December 4-5, 2018. The workshop deliberated on sources of mercury, environmentally sound management of mercury, regulatory and industry concerns in mercury management; challenges and opportunities in meeting the obligations of the Minamata Convention; approaches for conducting a national inventory of mercury as well as case studies of mercury contamination in India.²⁰²</p>

201 Available at: <http://www.mercuryconvention.org/portals/11/documents/notifications/india%20nfp.pdf> (Last accessed on November 19, 2019).

202 Available at: <http://www.in.undp.org/content/india/en/home/climate-and-disaster-resilience/successstories/press-release—two-day-workshop-on-minamata-convention-and-inven.html> (Last accessed on November 19, 2019).

Strategic Approach to International Chemicals Management, 2006	
Summary	<p>Acknowledgement of the essential economic role of chemicals and their contribution to improved living standards needs to be balanced with recognition of potential costs. These include the chemical industry's heavy use of water and energy and the potential adverse impacts of chemicals on the environment and human health. The diversity and potential severity of such impacts makes sound chemicals management a key cross-cutting issue for sustainable development. In February 2006, over 190 countries including India acceded to the Strategic Approach to International Chemicals Management (SAICM), an international policy framework to guide efforts to achieve the Johannesburg Plan of Implementation goal that, by 2020, chemicals will be produced and used in ways that minimize significant adverse impacts on the environment and human health. It may be noted that SAICM is a voluntary initiative which is not legally binding.²⁰³</p> <p>SAICM comprises the Dubai Declaration on International Chemicals Management and an Overarching Policy Strategy (OPS) which sets out its scope, needs, objectives, financial considerations underlying principles and approaches, and implementation and review arrangements. The Declaration and Strategy are accompanied by a Global Plan of Action (GPA) that serves as a working tool and guidance document to support implementation of SAICM.</p> <p>The Declaration refers to the insufficient progress been made in international chemicals management through the implementation of chapter 19 of Agenda 21, International Labour Organization Conventions No. 170 on Safety in the Use of Chemicals at Work and No. 174 on the Prevention of Major Industrial Accidents, Bahia</p>

203 Available at: <http://www.saicm.org/portals/12/documents/saicmtxts/saicm-publication-en.pdf> (Last accessed on November 19, 2019).

	<p>Declaration on Chemical Safety, 2005 World Summit Outcome, Basel, Rotterdam and Stockholm Conventions and the adoption of the Globally Harmonized System for the Classification and Labelling of Chemicals. It acknowledges the efforts being made by private sector, non-governmental public health and environmental organizations, trade unions and other civil society organizations towards this end.²⁰⁵</p> <p>Parties to the Declaration aim to work towards addressing the discrepancies between developed and developing countries with respect to achieving sustainable chemicals management by:²⁰⁶</p> <ul style="list-style-type: none">- strengthening of capacities for sound management of chemicals;- development of safer alternative products and processes, including non-chemical alternatives, through partnerships, technical support and financial assistance;- ensuring effective and efficient governance of chemicals management by means of transparency, public participation and accountability;- partnerships with all stakeholders;- making available data and information on health and environmental benefits and risks of chemicals;- ensuring that published information does not violate the confidentiality of commercial and industrial information wherever applicable;
--	--

204 Article 2, Dubai Declaration.

205 Articles 4 & 5, Dubai Declaration.

206 Text of Dubai Declaration.

	<ul style="list-style-type: none"> - prevent illegal traffic in toxic, hazardous, banned and severely restricted chemicals and chemical products and wastes; - promote the sound management of chemicals and hazardous waste as a priority in national, regional and international policy frameworks; - integrate SAICM into the work programmes of all relevant United Nations organizations, specialized agencies, funds and programmes. <p>The OPS has the main objectives of risk reduction, knowledge creation and information dissemination, governance, capacity-building and technical cooperation and curbs on illegal international traffic.²⁰⁷ Its scope includes environmental, economic, social, health and labour aspects of chemical safety.²⁰⁸ There are several strategies prescribed under each of these objectives within this document²⁰⁹ such as:</p> <ul style="list-style-type: none"> - Adherence to precautionary principle; - Obtaining scientific understanding for effective risk management; - Phasing out unmanageable chemicals by 2020; - Reduction of generation of hazardous waste; - Availability of objective scientific information; - Accelerated pace of scientific research on safer alternatives; - Strengthened enforcement of national legislations; - Promotion of codes of conduct; and
--	--

²⁰⁷ Article 1, OPS.

²⁰⁸ *Ibid* Article 3.

²⁰⁹ *Ibid* Articles 14, 15, 16, 17 & 18.

	<ul style="list-style-type: none"> - Adaption of chemicals management models from developed countries, among others. <p>Strategies for obtaining financial resources are provided within the OPS document as well, especially for economies in transition.²¹⁰ Institutional arrangements to support implementation and taking stock of progress on the SAICM will include national coordination and, as appropriate, regional processes and, at the international level, aperiodic review process facilitated by the International Conference on Chemicals Management (ICCM).²¹¹ The ICCM shall convene triennially. There shall also be Bureau setup for the Conference and the Open-ended Working Group (OEWG).</p> <p>Within the GPA possible work areas and their associated activities, actors, targets and timeframes, indicators of progress and implementation aspects are grouped according to five categories of objectives contained in the OPS.²¹²</p> <p>The Quick Start Programme (QSP) under SAICM is programme aimed to support and assist in enabling capacity building and implementation activities during the initial stages in the developing countries, least developed countries, small island developing States and countries with economies in transition.²¹³</p> <p>Resolutions adopted by the ICCM , inter alia, are on the following issues:</p> <ul style="list-style-type: none"> - Emerging policy issues, including adopting a new area of work on environmentally persistent pharmaceutical pollutants;
--	--

210 *Ibid* Article 19.

211 *Ibid* Articles 21, 24 & 28.

212 Article 2, GPA.

213 Article 19(e), OPS.

	<ul style="list-style-type: none"> - Addressing highly hazardous pesticides; - SAICM and sound management of chemicals and waste beyond 2020; - Activities and budget of the SAICM secretariat. <p>Emerging policy issues identified by SAICM:</p> <ul style="list-style-type: none"> - Lead in Paint; - Chemicals in Products; - Hazardous substance within the life cycle of electrical; and electronic products; - Nanotechnology and manufactured nanomaterials; - Endocrine-disrupting chemicals; - Environmentally Persistent Pharmaceutical Pollutants; - Perfluorinated chemicals. - Highly Hazardous Pesticides.
Indian ratification status/treaty obligations	<p>Being a signatory to SAICM, India needs to take the following steps²¹⁴:</p> <ul style="list-style-type: none"> - Inventorisation of chemical manufacturers (and storage facilities); - Inventorisation of Chemical substances in use, including relevant physical, chemical, ecological and toxicological data about them; - Legislation for Classification, Labelling and Packaging; - Legislation on Registration, Evaluation and Approval of toxic or dangerous chemicals; - Draft Chemical Policy to be finalised;

214 Available at: <http://www.moef.nic.in/division/introduction-12> (Last accessed on November 19, 2019).

	<ul style="list-style-type: none"> - National Centre for Chemicals to be setup to be a repository for all related data. <p>An Indian representative is one of the Vice Presidents in the Bureau setup for the fifth session of the Conference.</p>
Domestic application	<p>HSMD is the nodal point in the MoEF & CC for SAICM. Ministry of Chemicals and Fertilisers is also involved in the activities herein.</p> <p>India has proactively participated in all SAICM meetings and conferences. The India Government continues to integrate SAICM into relevant programmes and plans pertaining to chemicals and sustainable development. While developing these programmes and plans, the government tries to ensure relevant stakeholder participation. The government is in the process of establishing arrangements for implementing SAICM on an inter-ministerial and inter-institutional basis so that all concerned stakeholder interests are represented and all relevant substantive areas are addressed.</p> <p>India initiated the preparation of the National Chemicals Management Profile to assess India's infrastructure and capacity for management of chemicals. Other actions taken by the Ministry are:</p> <ul style="list-style-type: none"> - Initiated studies of inventorisation of lead, cadmium, mercury and arsenic in paints, distemper and pigments in the country - Initiated discussions with leading national laboratories - Notified the E-Waste (Management and Handling) Rules, 2016 for the management of electronic waste - Came out with the draft Dangerous Goods (Classification, Packaging and Labelling) Rules, 2013 in line with Globally Harmonized System.

OVERVIEW OF THE CHEMICAL SECTOR IN INDIA

4.1 BACKGROUND

Over the past few decades, India as a developing country has witnessed rampant industrial reforms whereby it has progressively metamorphosized from an agro-based economy into an industry-based economy. This economic transformation has much to owe to the pivotal role that the chemical sector has played in the economic growth of the country. In India, more often than not the chemical sector is commonly misconceived to encompass the production of pharmaceutical products. However, to view the chemical sector as merely constituting pharmaceuticals would be a misnomer because it would involve construing the magnitude of the sector narrowly. The sector covers a broad spectrum of industries producing various kinds of chemicals which include bulk chemicals, specialty chemicals and organic chemicals. Not only does it yield a significant boost to the development of the agricultural and industrial sectors, but the sector also serves as a key enabler for other sectors by providing building blocks for other downstream markets. The chemical industry is undoubtedly a key manufacturing sector in an industrialised economy.¹ Constituting a highly diversified industry covering over 80,000 commercial products, the Indian chemical sector accounts for 3% of the global chemical market.²

In the year 2017-18, the chemical manufacturing sector alone contributed a total of 2.1% towards the nation's Gross Domestic Product (GDP) and also accounted for a total 15.95% of India's manufacturing sector.³ Furthermore, according to the Annual

-
- 1 Neil Gunningham, Environmental Management Systems and Community Participation: Rethinking Chemical Industry Regulation, 319 16 UCLAJ. Envtl. L. &Policy 319 (1997).
 - 2 "FICCI", India Chem 2018, Available at: <http://ficci.in/spdocument/23036/knowledge%20paper-india%20chem%202018-ficci.pdf>. (Last accessed on November 19, 2019).
 - 3 Available at: <http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-chemicals> (Last accessed on November 19, 2019).

Report 2018-19 of the Ministry of Chemicals and Petrochemicals, the Index of Industrial Production (IIP) for the Chemicals and Chemical products for the month of March 2019 stands at 128.40 which is 1.18% higher as compared to the levels in the previous year.⁴ These numbers bear testimony to the fact that the chemical industry has built an impressive and consistent track record in the overall development of the economy.

This chapter maps the contribution of the chemical sector to the Indian economy as a whole. It delves into the myriad aspects pertaining the growth and significance of this sector. Furthermore, with a focus on the chemical waste management systems in place, the chapter inquiries into the various challenges and issues that wrought this sector in terms of chemical waste management, treatment and disposal.

4.2 ROLE OF THE CHEMICAL SECTOR AS A CONTRIBUTOR TO INDIAN ECONOMY

The chemical sector plays an instrumental role in boosting the economy by virtue of its nature as a knowledge based and human resource-intensive industry. It has also emerged as a major contributor to the global chemical sector's economic footprint. According to the data provided by Oxford Economics, out of the global contribution of 5.7 \$ Trillion, Indian chemical sector features as a major stakeholder among other developing nations.⁵ A cursory look into the performance and economic contribution of 4 major developing countries, as indicated below, shows that India has taken a leap in anchoring its position in the global chemical sector.

4 Annual Report, Ministry of Chemicals and Petrochemicals, 2018-19.

5 The Global Chemical Industry: Catalysing Growth and Addressing Our World's Sustainability Challenges Report for ICCA, page 10, Available at: iccachem.org/wpcontent/uploads/2019/03/icca_economicanalysis_report_030819.pdf (Last accessed on November 19, 2019).

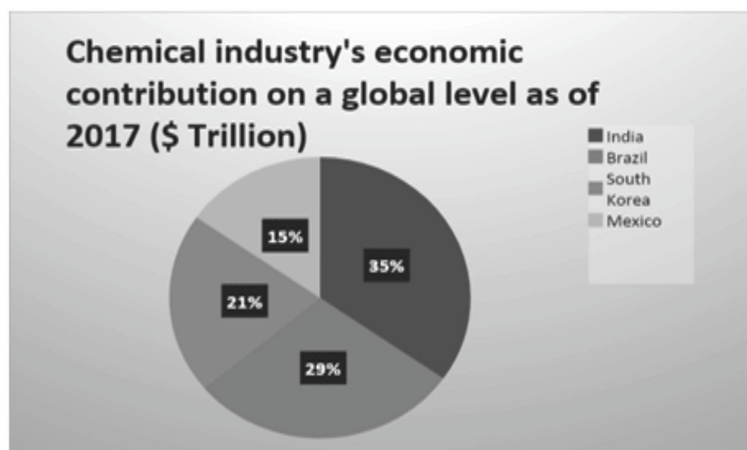


FIGURE 1: Source - ICCA Report: The Global Chemical Industry: Catalyzing Growth and Addressing Our World's Sustainability Challenges

Apart from the global contribution made, the sector has made immense contribution to the growth of the domestic economy which is evidenced by the following indicators-

4.2.1 CONTRIBUTION TO GROSS DOMESTIC PRODUCT (GDP)

According to the data provided by the World Bank, India has been maintaining an average GDP of around 7.42% over the past decade.⁶ The steady growth rate of the chemical sector has contributed to this consistent average. From 2014-15 to 2018- 19, the average annual growth rate of Chemicals and Chemicals Products calculated on the basis of IIP stands at 2.13% within the total manufacturing sector which amounts to 3.83%.⁷ Furthermore, with respect to the sectoral growth of the chemical sector alone, the IIP in 2018-19 shows a significant increase by 2.15% in the production levels when compared to the previous year.⁸

6 Available at: <https://data.worldbank.org/indicator/ny.gdp.mktg.kd.zg?end=2018&locations=in&start=2008> (Last accessed on November 19, 2019).

7 Department of Chemicals and Petrochemicals Annual Report 2018-19, page 8.

8 Available at: <http://mospi.nic.in/iip> (Last accessed on November 19, 2019).

4.2.2 CONTRIBUTION TO GROSS VALUE ADDED (GVA)

GDP and GVA are primary indicators that highlight the demand and supply of products and services respectively. They bring about the efficiency of economic activity in a particular industry. In the year 2018-19, the manufacturing industry accounted for 29.6% of the GVA to the domestic production.⁹ Within this the chemical and chemical products sector accounted for 1.41% of the GVA for all economic activities according to the CSO's National Accounts Statistics 2018.¹⁰ This improvement brings to light the flourishing and profit-generating nature of the sector.

4.2.3 EMPLOYMENT GENERATION

Employment generation, according to Goal 8 of the Sustainable Development Goals, is an aspect which lays emphasis on decent work and economic growth.¹¹ Owing to its human resource-intensive nature, the chemical sector employs more than over a million people.¹² The Economic Survey of 2018-19 identifies the chemical sector as one having a pre-dominantly high employment elasticity.¹³ This brings to light the highly accommodative capacity of the sector as it requires both skilled and unskilled labour. Additionally, the current policy initiatives such as setting up of Petroleum Chemicals and Petrochemicals Investment Regions (PCPIR's) and plastic parks further act as catalysts to boost employment generation.¹⁴

9 Available at: <https://www.prindia.org/report-summaries/economic-survey-2018-19> (Last accessed on November 19, 2019).

10 Department of Chemicals and Petrochemicals Annual Report 2018-19 page 5.

11 Available at: <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-8-decent-work-and-economic-growth.html> (Last accessed on November 19, 2019).

12 Planning Commission Working Group on Indian Chemical Industry page 12, Available at: http://planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_chemical.pdf (Last accessed on November 19, 2019).

13 Economic Survey 2018-19 Vol 1 page 76, Available at: <https://www.indiabudget.gov.in/economicsurvey/doc/echapter.pdf> (Last accessed on November 19, 2019).

14 Department of Chemicals and Petrochemicals Annual Report 2018-19 page 16.

4.2.4 FACILITATES FOREIGN INVESTMENTS

The chemical sector fosters a conducive platform for Foreign Direct Investment (FDI). According to the FDI policy, the chemical sector is open to 100% FDI except in case of hazardous chemicals.¹⁵ This liberalised approach has reflected a positive upward trend in the receipt of FDI equity inflows to a sum of 2.2 USD Billion between the years 2014-16 as compared to 1.1 USD Billion during the preceding two year period.¹⁶ The emergence of India as a major manufacturing destination for chemical products has further enhanced the foreign investments into the economy.

4.2.5 CREATES A VIBRANT MARKET FOR IMPORT AND EXPORT

Globally, the chemical sector is estimated at USD 4.7 Trillion as it is also driven by demand from end-use industries. While these numbers appear to be staggeringly high, the Indian chemical sector is estimated to be valued at USD 163 Billion. It ranks 14th in exports and 8th in imports of chemicals (excluding pharmaceutical products) globally.¹⁷ As per the import figures for the year 2018-19, the Import of Chemicals and Petrochemical products (excluding Pharmaceutical Products and Fertilizers) contributed 11% to the total imports in 2018-19. The exports on the other hand, contributed 12.3% to the total exports in the year 2018-19. This significant rise in the quantity of chemicals being imported into the country throws light on the rising quantum of chemicals being consumed as primary products as well as used by industries in other downstream markets. Furthermore, trends in international trade also highlight an increased consumption and use of chemicals and chemical products in India.

4.3 KEY DRIVERS FOR GROWTH OF THE CHEMICAL SECTOR

Chemicals form the primary raw material for many manufacturing industries like agro-chemicals, synthetic rubbers, pharmaceutical sectors, consumer products and other

15 Available at: <https://makeinindia.com/sector/chemicals> (Last accesses on November 19, 2019).

16 Chemicals and Petrochemicals Sector Achievement Report page 3 (Department of Chemicals and Petrochemicals) Available at: drive.google.com/file/d/0b-tv7_upckanekpqm2nhyndkqw8/view (Last accessed on November 19, 2019).

17 FICCI Knowledge Paper, *Infra* note 26.

ancillary industries.¹⁸ The very nature of chemicals makes it indispensable in facilitating miscellaneous industrial applications. Thus, the sector primarily thrives owing to the dependency of the other downstream markets. In addition to this, certain developing country requirements also have a bearing on the Chemical sector. An amalgamation of such varied factors provides the necessary impetus for the growth of the chemical sector in India as illustrated below.

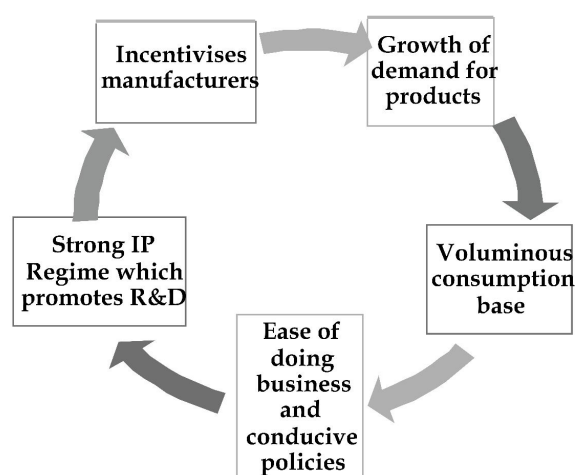


FIGURE 2: Interplay between the key drivers of growth of Chemical sector

The key areas which has influenced the growth of the Chemical industry are-

(a) Robust demand for products and Voluminous Consumption rates

The growth of the Chemical sector is supported by the robust demand for these products owing to the huge consumption base of the ever-increasing population. The country is ranked the third largest on the basis of its Purchasing Power Parity (PPP). These

¹⁸ Indian Chemical Industry Challenges and Opportunities- the Associated Chambers of Commerce and Industry of India, Available at: https://www.resurgentindia.com/pro_bfloors/services_img/pdf_teders/2093224542challenges-and-opportunities-report-f.pdf (Last accessed on November 19, 2019); IMF World Economic Outlook (april-2019), Available at: <https://www.imf.org/external/pubs/ft/weo/2019/01/weodata/weorept.aspx?pr.x=34&pr.y=5&sy=2019&ey=2024&ssd=1&sort=country&ds=.&br=1&c=534&s=ngdpd%2cpppgdp&grp=0&a=> (Last accessed on November 19, 2019).

consumption rates have fuelled a robust demand for these products thereby creating a profitable domestic market alongside a lucrative investment opportunity for foreign players. The shift in the consumption pattern of chemical products over the past decade is indicated as below-



FIGURE 3 - Source: India Stats(Annual Report)

(b) Availability of cheap labour

Chemical Industry in India provides abundance of employment opportunities owing to the diversification of its business activities and the magnitude of its operation. The share of wages paid in the chemical sector in India is less owing the abundance of availability of cheap labour which shows a declining trend towards providing wages in this Sector.¹⁹ This provides sufficient incentives for foreign and domestic chemical industry manufacturers to set up bases and establish production units within India.

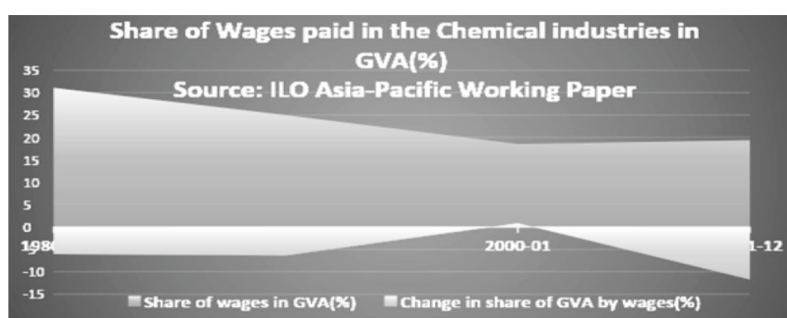


FIGURE 4

¹⁹ Available at: lo.org/wcmsp5/groups/public/—asia/—ro-bangkok/—sronew_delhi/documents/publication/wcms_614777.pdf (Last accessed on November 19, 2019).

(c) Ease of doing business and conducive policy initiatives

In the pursuit of securing a profitable market for foreign investments, the conduciveness of the business environment is an essential pre-requisite. There has been a consistent improvement in the ease of doing business index rankings of India. With the latest World Bank's Ease of Doing Business Report 2019, India is ranked at the 77th position.²⁰ This significant improvement has paved way to open up the economy in this era of globalisation.

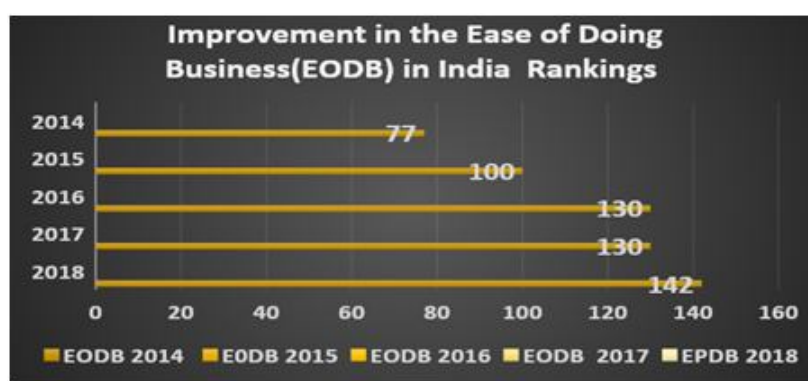


FIGURE 5 - Source: World Bank's Report on ease of Doing Business

The ease of doing business is largely fuelled by a couple of policy initiatives with its prime focus on strengthening the Chemical Sector in India-

- (a) “Make in India” initiative** – The identification of chemical sector among 25 other sectors to be a part of the Make in India initiative led by the Department of Industrial Policy and Promotion (DIPP) and Ministry of Commerce and Industry is reflective of the government initiative to focus and strengthen the sector.²¹ The initiative fosters research into emerging areas such as specialty chemicals and agro-chemicals by promoting investment into the sector and thereby anchoring the position of the chemical sector as a major contributor to the manufacturing industries.²²

20 Available at: https://www.doingbusiness.org/content/dam/doingbusiness/media/annual-reports/english/db2019-report_web-version.pdf (Last accessed on November 19, 2019).

21 Available at: <https://www.ibef.org/economy/make-in-india> (Last accessed on November 19, 2019).

- (b) **Proposal for establishing Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs)**- The PCPIR's are proposed to be set up in designated notified areas in 4 regions of the country. This is done to provide infrastructure-intensive logistical support to make the country a suitable investment destination. This comes at a time when India is perceived as an emerging global leader in the chemical sector. The proposed implementation of Petroleum, Chemical and Petrochemical Investment Regions (PCPIRs) is said to be a major source of employment generation apart from its numerous other benefits. The amount of prospective employment generation envisaged by the proposal for setting up these PCPIR's is around 33.96 Lakh persons.²³
- (c) **Strong Intellectual Policy regime which encourages R&D initiatives**- The IP regime supported by a strong legal framework incentivises manufacturers to innovate in the realm of chemical products. These factors especially are relevant in the pharmaceutical sector to ensure sufficient legal protection to pharmaceutical companies who invest an exorbitant amount in Research and Development and clinical trials.
- (d) **Revamping of the tax regime**- The consolidation of the indirect taxes into the unifying Goods and Services Tax(GST) regime has borne positive results especially with respect to the pharmaceutical sector. The previous tax systems adopted created a cascading effect thereby increasing the price of the end product. With the elimination of taxes on multiple levels, chemical products and pharmaceutical products in particular, have become more viable from a consumers' perspective. The impact that the GST regime has therefore been positive and the same can be understood from the diagram ²⁴ below:

22 Chemicals and Petrochemicals Sector achievement Report(Department of Chemicals and Petrochemicals) drive.google.com/file/d/0b-tv7_upckanekpqm2nhyndkqw8/view (Last accessed on November 19, 2019).

23 Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=181238> (Last accessed on November 19, 2019).

24 Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=184756> (Last accessed on November 19, 2019).

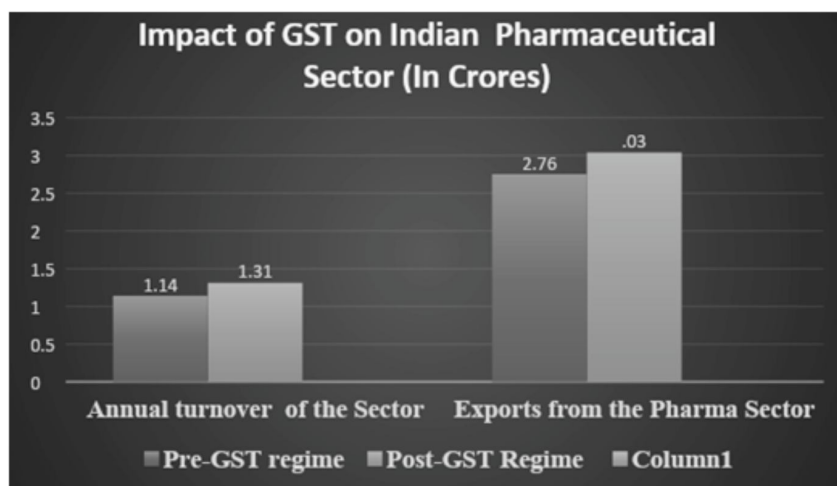


FIGURE 6 - Source: Press Information Bureau

4.4 THE FUNCTIONING OF THE CHEMICAL SECTOR

The chemical industry in India is a mix of public sector undertakings along with private players in the market. The Public Sector Undertakings (PSU's) majorly constitute 3 major stakeholders- Hindustan Organic Chemicals Ltd. (HOCL), HIL (India) Limited and Hindustan Fluorocarbons Limited (HFL).²⁵ It has been established that the chemical sector is broad and multifarious consisting of multiple industries producing diverse categories of chemicals and chemical products. The list is indefinite. But for the purpose of specific industrial demarcation, the Department of Chemicals and Petrochemicals has segregated these chemicals on the basis of their composition and use. The categories of chemical manufacturing industries have been devised and segmented as follows:

- Alkali Chemicals
- Inorganic Chemicals
- Organic Chemicals
- Pesticides
- Dyes & Pigments

25 Department of Chemicals and Petrochemicals Annual Report 2018-19 page 2.

- Basic Major Chemicals
- Synthetic Fibres
- Polymers
- Elastomers (S. Rubber) Synth.
- Detergent Intermediates
- Performance Plastics

These industries have been identified as key players that contribute to the revenue generation in the economy. Though they do not represent an exhaustive list of chemicals produced, they are a categorical reflection of major chemical producing industries in the sector.

The nature of the sector is such that it requires regulation at multiple levels- Production, consumption by ancillary industries, disposal and treatment of chemical waste.

(a) Production and Consumption of Major Chemicals

As per the IIP, the total quantum of chemicals and chemical products manufactured and produced by the domestic industries stands at 27,847 million tonnes. Furthermore, the volume of production in each of these chemicals have been accounted for as follows.

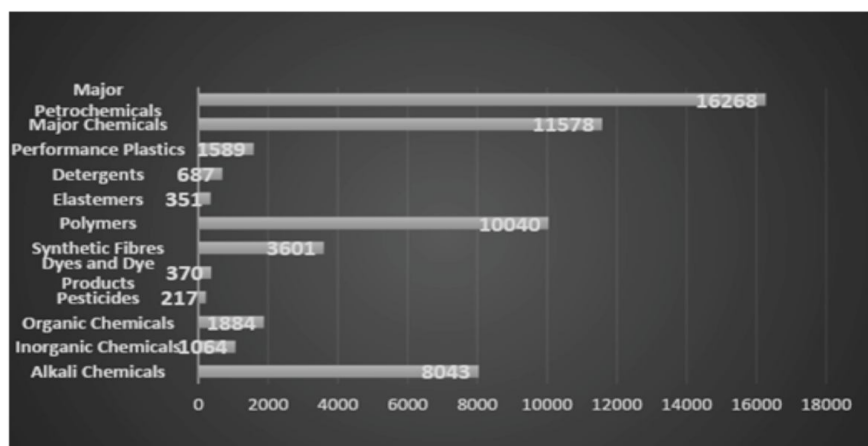


FIGURE 7 - Source: Annual Report 2018-19, Department of Chemicals and Petrochemicals

The Indian chemical industry comprises of a wide range of small scale as well as large scale units that cater to the increasing demand and consumption of such chemicals. Furthermore, the current per capita consumption of chemical products in India is about 1/10th of the world average and the demand is said to increase by an average of 9% per annum.²⁶ (Refer to Figure 3)

(b) Discharge of Chemical Waste

A cursory glance of the production patterns in the chemical industry suggests that the quantum of chemicals and chemical based products are being produced at a staggering rate. With this rapid rise in the production of chemicals, it is only natural to that the amount of chemical waste emitted from such industrial activity also increases. Thus, the chemical industry acts as a major source for environmental pollution. According to the report of the Central Pollution Control Board, the numbers hazardous waste generating industries authorized to generate hazardous waste in the year 2016-17 was approximately 56,350. The quantum of hazardous waste generated by these industries was further found to be 25.46 million Metric Tonnes(MT) which included a major portion of toxic chemical waste.²⁷ Furthermore, as per the annual return submitted by the occupiers the quantum of hazardous waste generated was around 7.17 Million MT.

(c) Treatment of chemical waste

As it is pointed out that the chemical sector is responsible for generating industrial waste which is toxic in nature. In the absence of safe-handling of chemical waste through effective disposal and treatment measures, it can be lethal to health and environment. Although chemical waste and the treatment thereof is not specifically regulated as a separate category, it has been included within the ambit of 'hazardous waste'. According to Rule 3(1)(17) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016²⁸ (Waste Management Rules) "hazardous waste" is defined to

26 "FICCI", India Chem 2018, Available at: <http://ficci.in/spdocument/23036/knowledge%20paper-india%20chem%202018-ficci.pdf> (Last accessed on November 19, 2019).

27 CPCB Report - National Inventory Report on Hazardous Waste Generation and Its Management (2016-17).

28 Rule 3(1)(17) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

mean any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment. Therefore, chemical waste falls within the ambit of hazardous waste.

Schedule III of the Waste Management Rules of 2016 categorizes hazardous waste on the basis of the nature as the following:

1. Explosive and Flammable

An explosive waste is a liquid or solid substance which in itself can cause damage to the surrounding due to a chemical reaction of producing gas at a specific temperature and pressure and a specific speed. It also includes substances that give off flammable vapour and can combust in an instant.

2. Oxidising Waste

These are wastes which may contribute to combustion by exposing itself to oxygen while they aren't inherently combustible in nature.

3. Organic Peroxides

Organic substances or wastes which contain the bivalent-o-o-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.

4. Poisons (acute)

Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

5. Infectious substances

Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.

6. Corrosives

Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards

7. Toxic (delayed or chronic)

Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity).

8. Eco-toxic

Substances or wastes which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

From the aforementioned categorisation, it is clear that the nature of these chemicals require the establishment of an efficient system of treatment and disposal facilities to ensure minimal harm to health and environment. In order to facilitate the same, the Central Pollution Control Board (CPCB) acts a regulator. The CPCB has tabulated a list of treatment, storage and disposal facilities with respect to the management of hazardous waste. Accordingly, the total number of Common Integrated Treatment, Storage & Disposal Facilities (TSDFs), Common Incinerators & Secured Landfills:²⁹

Integrated TSDFs (with both SLF and Incinerator): 17

TSDFs with only Common Incinerators: 9

TSDFs with only Common Secured Landfills: 15

Furthermore, the number of facilities available in every state and union territory is as follows:

²⁹ Available at: <http://cpcbenviis.nic.in/tsdf.html> (Last accessed on November 19, 2019).

Sl.No.	Name of the State / UT	Number of Common TSDFs in operation
1.	Andhra Pradesh	No of TSDFs - 1
2.	Arunachal Pradesh	Nil
3.	Assam	Nil
4.	Bihar	Proposed, near Bojpur, Patna district EC under progress
5.	Chhattisgarh	Proposed
6.	Delhi	Nil
7.	Goa	Proposed at Dharbandora, Sanguem,
8.	Gujarat	No of TSDFs - 11 TSDFs Integrated – 4 TSDFs with common SLFs - 5 TSDFs with only Common Incinerator – 2
9.	Haryana	No of TSDFs - 01 TSDF integrated – 1
10.	Himachal Pradesh	No of TSDFs - 01 TSDF with only common SLF – 01
11.	Jammu & Kashmir	Proposed, EC under progress
12.	Jharkhand	Proposed, EC under progress
13.	Karnataka	No of TSDFs - 07 TSDF with only common SLF - 2 TSDF with only common Incinerators – 5
14.	Kerala	No of TSDFs - 1 TSDF with only common SLF – 1
15.	Madhya Pradesh	No of TSDFs - 1 TSDF Integrated – 1

16.	Maharashtra	Total TSDFs - 4 (Proposed TSDFs – 1 at Mahad) TSDFs Integrated – 3 TSDFs with only common SLFs– 1.
17.	Manipur	Nil
18.	Meghalaya	Nil
19.	Mizoram	Nil
20.	Nagaland	Nil
21.	Odisha	No of TSDFs – 1 TSDF with only common SLF - 1
22.	Punjab	No of TSDFs – 1 TSDF with only common SLF - 1
23.	Rajasthan	No of TSDFs – 3 TSDF with only common SLF - 2 TSDF with only common Incinerator – 1
24.	Sikkim	Nil
25.	Tamil Nadu	No of TSDFs – 1 TSDF Integrated – 1
26.	Telangana	No of TSDFs - 1 TSDFs integrated – 1
27.	Tripura	Nil
28.	Uttar Pradesh	No of TSDFs – 4 TSDFs Integrated - 2 TSDFs with only common SLF - 1 TSDFs with only common Incinerator – 1
29.	Uttarakhand	No of TSDFs – 1 TSDFs Integrated – 1
30.	West Bengal	No of TSDFs – 1 TSDFs Integrated – 1
31.	Andaman & Nicobar Islands	Nil
32.	Chandigarh	Nil
33.	Daman, Diu, Dadra & Nagar Haveli	No of TSDFs – 1 TSDFs Integrated – 1

34.	Lakshadweep	Nil
35.	Puducherry	Nil

An important point to be noted from the statistics provided above is that 13 states and union territories do not have efficiently function to dispose TSDFs at all. Therefore, in such states, the question remains as to how the waste generated is being treated. Furthermore, in 6 states, the facilities are proposed to be set up. In the absence of adequate TSDF's for a sector of this magnitude, it is of paramount importance to take positive steps in this regard.

4.5 CHALLENGES FACED IN THE DISPOSAL, STORAGE AND TRANSPORTATION OF HAZARDOUS WASTE

(a) The dangers of improper and unregulated disposal

Untreated waste is disposed into water bodies like rivers, lakes and streams creates water pollution which makes the water bodies unfit for drinking and agricultural purposes. this also affects the animals and plants who depend on this water for survival. The risk of contamination of groundwater supplies due to leachates from landfills depends on several factors: toxicity and volume of the contaminant generated at each site, the nature of the geologic medium underlying the site, and the hydrologic conditions dominant in the area.³⁰

Additionally, the poorest members of the global community face higher risks. In urban areas, low-income or minority populations are often exposed to hazardous chemicals and associated wastes in their jobs or because they reside in polluted areas.³¹ Further, the progressive decline in the standard of services in collection and disposal of waste, and the lack of awareness in doing the same, has left a huge amount of solid waste unattended in urban areas. This leads to an increase in morbidity due to microbial and parasitic infections especially in the densely populated slums in urban areas because of the rise in

30 Report of High Power Committee on Urban Solid Waste Management in India, Planning Commission of India 1995.

31 Available at: <https://www.undp.org/content/undp/en/home/2030-agenda-for-sustainable-development/planet/environment-and-natural-capital/chemicals-and-waste-management.html>(Last accessed on November 19, 2019).

unsanitary conditions.³² In rural areas, most chemical exposure and environmental pollution is linked to the misuse of agricultural chemicals and pollution brought by waterways, impacting the natural resources upon which these communities depend.³³

Small, medium and large scale industries generate hazardous waste on the basis of which these industries are classified. In terms of regulation the identification of large and medium scale industries as contributors to the chemical sector have been acknowledged. But the problem arises in the regulation of the small scale industries which are widespread and in abundance. This makes it hard to identify and monitor in order to regulate the generation and disposal of waste. Figure 8 showcases the hazardous waste generated by small scale industries which ought to be regulated but are not being done efficiently.³⁴

HAZARDOUS WASTE IN SOME SMALL SCALE INDUSTRIES

INDUSTRY	BROADLY HAZARDOUS WASTES
1. Electroplating and metal finishing shops	Plating and cleaning bath have hazardous solid constituents of asbestos, chlorinated hydrocarbon, cyanide, arsenic & heavy metals like chromium, nickel, copper, cadmium and zinc.
2. Engineering workshops and Automobile Workshops	Solid wastes contain mixed heavy metals, heavy oils rags, cyanides and flammable solvents, soaked rags.
3. Storage battery & Repair shops	They produce sedimentary sludge containing high percentage of Lead Sulphate and other Lead compounds.
4. Foundries	The sludge is mostly inorganic but contain heavy metals like Lead, Zinc, Copper, Manganese, Nickel, Chromium as well as Iron.
5. Textile dyeing & processing	These industries are notorious for more liquid pollutant than solid wastes but do produce solid waste as filter cakes etc. containing harmful chemicals of various types.
6. Paint & Allied products	Paint waste containing metal oxides and other organic components.
7. Petroleum product refining	Acid & Alkali sludge and contaminated mobile oil filter clays.
8. Inorganic chemical processing	Inorganic pigments and soluble & insoluble salts process sludges containing harmful heavy metals.
9. Organic chemicals	Filter cakes and sludges containing toxic organic compounds like pesticides industrial organics etc.
10. Pharmaceuticals	Wastes normally are contaminated with filter cakes, filter papers, carbons with halogenated & non-halogenated solvents, etc.
11. Leather tanning & finishing	Sludges from treatment tanks have trivalent Chromium, Lead, Zinc & Copper

FIGURE 8³⁵

32 Report of High Power Committee on Urban Solid Waste Management in India, Planning Commission of India 1995.

33 Available at: <https://www.undp.org/content/undp/en/home/2030-agenda-for-sustainable-development/planet/environment-and-natural-capital/chemicals-and-waste-management.html> (Last accessed on November 19, 2019).

34 Report of High Power Committee on Urban Solid Waste Management in India, Planning Commission of India 1995.

35 *Ibid.*

(b) Inefficient storage and transportation of hazardous waste

The storage of industrial solid waste is often one of the most neglected areas of operation of an industry. Very little attention is paid to proper storage and heaps of mixed waste piled against a wall or on open ground are common sights in many factories. Concrete bays or disused drums are also often used for storage. Sledges originating from holding tanks or interceptors do not present storage problems; no separate sludge storage is required, because the sludge is retained in the tank until sufficient quantities are collected.³⁶

Transportation of industrial wastes in metropolitan areas of developing countries is generally not by purpose-built vehicles such as skip-carrying Lorries, but by open trucks. The wastes are not covered during transportation. It is rare for special arrangements to be made for hazardous wastes; they are usually collected together with the other wastes. Contractors who carry hazardous waste do not need to be licensed, and consequently, there is little control over either the types of firms engaged in carrying hazardous waste or the vehicles used to transport such waste.

4.6 BHOPAL GAS TRAGEDY- A CASE OF INEFFICIENT WASTE DISPOSAL

The fatal night of 2nd December 1984, while the workers of the then Union Carbide Corporation (UCC) were washing the pipes clogged with solid hazardous wastes an exothermic reaction was set off while the water seeped through the valves of two tanks storing Methyl Isocyanate (MIC), thereby causing its discharge into the atmosphere causing immediate death and injury of thousands of people who came in contact with the gaseous mixture.

It is pertinent to note that UCC established its plant in Bhopal, and the factory was constructed approximately within a 2 km radius from the railway station and adjacent to a residential locality. Proposals for installation of a waste liquid incinerator facility for the disposal of waste but these proposals were not implemented. Even with the enactment of the Air and Water Act prior to the disaster, UCC and UCIL had not abide by the regulations. There was contamination within the factory premises itself.

36 *Ibid.*

The Effluent Treatment Plants (ETP) to minimise the pollution of water bodies not being installed to support the evaporation ponds which had the possibility of contaminating the surrounding areas due to overflow.³⁷ The non-compliance with the regulatory standards under the pre-existing regime led to the disaster which could have been prevented had UCC and UCIL abided by the Rules.

In 1989, UCC approved the 'Site Rehabilitation Project- Bhopal Plant' to decontaminate and dispose the hazardous waste generated from the disaster which included high quantities of Sevin and Naphthol tarry residues. National Environmental Engineering Research Institute (NEERI) took up the task of submitting a report on the examination of the soil in 1990 where it stated that there was no contamination of groundwater in and around the site of the MIC plant. But UCC itself doubted the legitimacy of the report stating that the area contained quantities of Sevin and Naphthol far more than the permitted levels by Indian Statistical Institute for inland disposal.³⁸ This highlights that the Government did not have the expertise to take adequate measures to foresee the effect that the waste would have on the land in and around the plant. But even though this rehabilitation project was proposed, the implementation of the same fell back.

In 2001, Dow Chemicals took over Union Carbide however, refusing to accept the liability of the disaster, and the disposal of the waste even though the Polluter Pays Principle was imposed on them.³⁹ Apathy lies in the fact that several tonnes of hazardous substance left in the factory for over 2 decades after the disaster, had subsumed to become Waste and concerns of the accumulated waste was addressed by the Jabalpur High Court in 2007, while ordering the Madhya Pradesh Pollution Control Board (MPPCB) and the Central Pollution Control Board to take action on the waste in the UCC plant area. It was alarming that the Boards were conflicted on deciding a suitable location to bury or

37 Available at: http://toxicslink.org/docs/06036_bhopal_report.pdf (Last accessed on November 19, 2019).

38 Available at: <http://www.ielrc.org/content/w0405.pdf> (Last accessed on November 19, 2019).

39 Available at: <https://corporate.dow.com/en-us/about/legal/issues/bhopal/tragedy.html> (Last accessed on November 19, 2019).

incinerate the waste.⁴⁰ This portrayed the inefficiency of the laws enacted in India to facilitate the disposal of toxic wastes in India.

However, the MPPCB, in successive consecutive failures of performed the following four methodologies for disposal of the waste:

- **Land Filling at Pithampur, Indore:**

First, they decided to dispose the waste within the State at Pithampur near Indore. After 40 tonnes had already been buried, the actions of the Board came to the awareness of the people living there which led to the resistance of this action and the people succeeded in diverting the waste from being dumped.

- **Incineration at Ankleshwar, Gujarat:**

Secondly, the CPCB took up the initiative to incinerate the waste in Ankleshwar, Gujarat. But this plan failed as well because the incinerator caught fire and the local people raised objections against the same.

- **Incineration at DRDO Facility, Nagpur:**

Thirdly, the Board decided to incinerate the waste in the Defence Research and Development Organization facility around 30 kms from Nagpur in Maharashtra. The people from a neighbouring village called Ruikhairi objected this act by going to the Court because incineration of the waste which contained chlorinated chemicals and heavy metals would expose deadly toxins in the air. Thus, the plan failed.

- **Disposal at Taloja, Mumbai**

Lastly, which is the most recent plan, was to dispose the waste in a facility near Taloja in Navi Mumbai. This plan also failed in implementation because it is not possible to transport tonnes of waste for around 600 kms from Bhopal. It would

⁴⁰ Available at: https://www.jstor.org/stable/pdf/41419808.pdf?ab_segments=0%2fbasic_sync-4222%2ftest&refreqid=search%3a5b058b19c1dc4363b6242e55ed9c7db1 (Last accessed on November 19, 2019).

also breach the rules controlling disposal of hazardous waste which states that the wastes must be managed closer to the plant to prevent further hazards during transportation.⁴¹

In 2015, there was a proposal from Gesellschaft für Internationale Zusammenarbeit (GIZ) to airlift the waste to Germany and incinerate it. But the German public and activists opposed this proposal. Further the representatives of India and Germany were not able to negotiate on certain clauses of the agreement with respect to the liability of the transport and incineration. The disposal of the waste was proposed to take place in the incinerator in Hamburg which would have cost India about 3.4 million⁴² and there was a dilemma as to whether the burden of the costs would be taken up by the Government of India or Dow Chemicals. Thus, Germany retracted their proposal to incinerate the waste. Despite all these failed mechanisms, the government remains lackadaisical about enacting stringent and clear guidelines for disposal of toxic waste and the pile of waste in the Bhopal Plant remains untouched. The effects of the disaster still felt by the people who live in the vicinity of the plant. Despite having wreaked havoc which continues to affect the environment and human health, there is a need for adequate measures to be taken up to resolve this dire situation.

4.7 GLOBAL OUTLOOK ON THE NEED FOR EFFECTIVE CHEMICAL WASTE MANAGEMENT

The universal impediment to effective chemical waste management happens to be insufficient measures to ensure effective chemical treatment plants and safe handling of chemicals. Sound chemical waste management by virtue of its impact becomes imperative in light of achieving the Sustainable Development Goals owing to its inherent connection it shares with the collective goals.⁴³ This flows as a necessary corollary to the global

41 Bhopal's Toxic Legacy, Available at: https://www.jstor.org/stable/pdf/41419808.pdf?ab_segments=0%2fbasic_syc-4222%2ftest&refreqid=search%3a5b058b19c1dc4363b6242e55ed9c7db1 (Last accessed on November 19, 2019).

42 Available at: <https://www.dw.com/en/germans-back-out-of-bhopal-cleanup/a-16250333> (Last accessed on November 19, 2019).

43 Chemicals and Waste Management: Essential to Achieving the Sustainable Development Goals (SDGs), Available at: https://www.who.int/iomc/chemicalsandsdgs_interactive_feb2018_new.pdf (Last accessed on November 19, 2019).

chemical output generated by the developed and the developing countries emphasising the need for an effective system of chemical waste management. The global chemical output has grown by a staggering 84% between the years 2000 and 2010 and with emerging developing economies almost accounting for 65% of the increase.⁴⁴

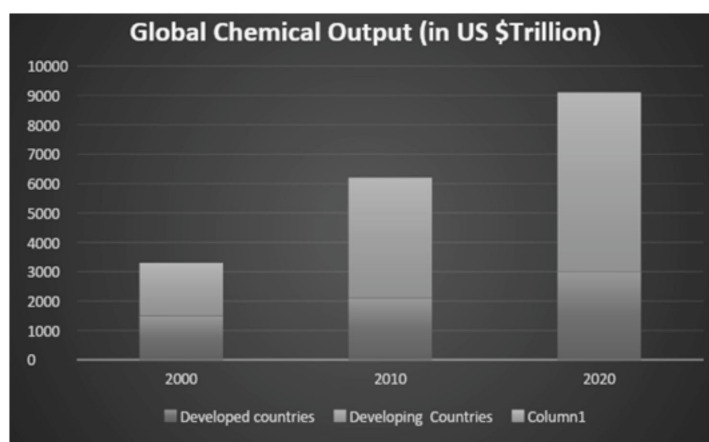


FIGURE 9 Source: UNEP Chemicals Outlook 2013

This clearly indicates that developing countries being primary contributors to the Global Chemical Output, there is a need for an effective system of chemical waste management. It is often important to analyse the collaboration of the BRICS nations from an environmental standpoint as these developing countries are largely dependent on their industries for the growth of the economy. With the environmental concerns constantly being at loggerheads with developmental activities, the amount of investment made with respect to environmental protection becomes imperative to understand.

44 UNEP Global Chemicals Outlook 2013.

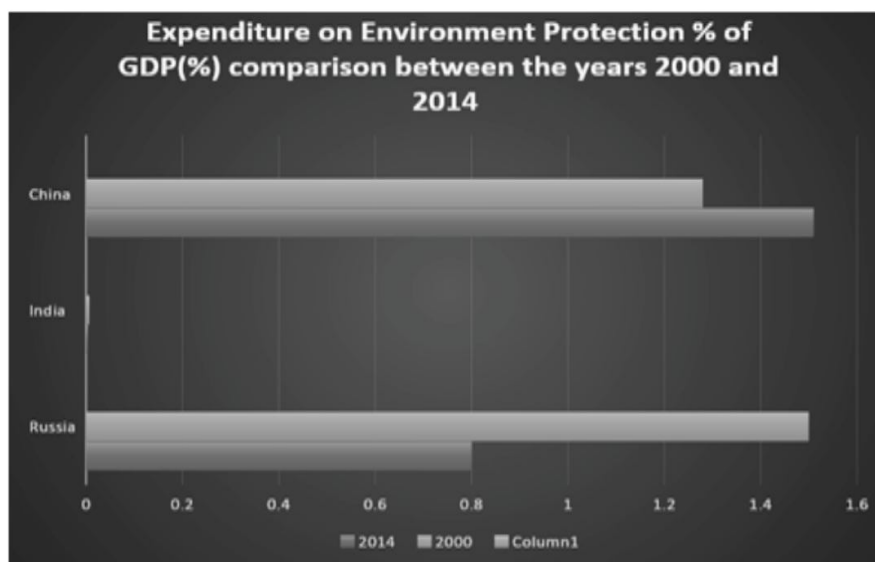


FIGURE-10 Source: BRICS Statistical Publication 2016

The above graphical representation clearly indicates that the amount of expenditure made on Environment Protection by India has been rather meagre in comparison to other BRICS nations that have been compared above.⁴⁵ The question of effective chemical waste management looms large if we construe out of this meagre expenditure on environment protection how much would be actually allocated for the cause of chemical waste management.

This does not mean that efforts and initiatives are not underway to ensure sustainability in terms of effective chemical waste management. The BRICS Nations have signed a MoU in 2018 for approach on matters such as waste management in pursuance of the SDG's and the 2030 Agenda for Sustainable Development.⁴⁶

45 BRICS Statistical Publication 2016, page 95-97, Available at: http://mospi.nic.in/sites/default/files/publication_reports/brics_jsp_2016.pdf (Last accessed on November 19, 2019).

46 BRICS Environment Ministers sign Memorandum of Understanding (MoU), 26 July 2018, Department of Environmental Affairs, Republic of South Africa, Available at: https://www.environment.gov.za/mediarelease/brics2015_environmentministers_sign_mou (Last accessed on November 19, 2019).

Table I The status of generation of hazardous waste in the country as of 2001, 2009 and 2016

Description	Million tonnes per annum (as of 2000) ⁴⁷	Million tonnes per annum (as of 2009) ⁴⁸	Million tonnes per annum (as of 2016) ⁴⁹
No. of industries generating hazardous wastes	12, 584 nos.	36,165	43,938 nos.
Total generation of hazardous waste	7.243	6.232507	7.467
Lanfillable Hazardous waste	5.250	2.728	3.416
Incinerable waste	0.118	0.415	0.695
Recyclable waste	1.4292	0.3088	3.356

With respect to the BRICS countries, measures have been adopted to ensure hazardous waste management in terms of management facilities, yet there needs to be a lot done with regard to ensuring sufficiency of these measure to tackle the problem of hazardous waste management owing to the fact that these are largely industry-oriented economies.⁵⁰

4.8 THE NEED FOR REGULATION OF THE CHEMICAL SECTOR IN INDIA

An overview of the chemical sector as provided above portrays that there is a robust system in place to regulate the sector as a whole. This is not to say that the regulatory

⁴⁷ Report of MoEF 2000.

⁴⁸ National Inventory of Hazardous Wastes Generating Industries and Hazardous Waste Management in India, CPCB 2009.

⁴⁹ CPCB Bulletin Vol. I, July 2016, Govt. of India.

⁵⁰ Global Waste Management Outlook, UNEP and ISWA, page 284, Available at: <https://www.unclelearn.org/sites/default/files/inventory/unept23092015.pdf> (Last accessed on November 19, 2019).

regime in place is devoid of loopholes. There are certain industry-specific requirements which have not been adequately catered to in the existing framework. These ambiguities and lacunae pose certain challenges in the effective regulation of the sector. The possible hurdles in the effective regulation of the chemical sector are summarised as below.

- **Nascent legal framework-**

The legal framework for the regulation of the Sector is yet to encapsulate the essence of the peculiar nature of the Industry which requires regulation at multiple levels.

- (i) **Ambiguity in definitions-** The Environment Protection Act, 1986 which is an umbrella legislation with regard to the aspects of environmental regulation does not define what constitutes “chemical waste” nor does it define what a “chemical substance”. It goes on to define the term “hazardous substance” under Section 2(e) in which there is no cogent understanding of the amount of importance given to the chemical industry and dealing with the nuances of chemicals as a category which requires separate focus owing to its nature.
- (ii) **Absence of a specific legislation to specifically cater to needs to the Chemical sector in India-** With respect to the Chemical sector, currently there is only a policy framework in the nature of a National Chemical Policy which has not yet come to force. All the matters under the Chemical Industry currently are being dealt under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 with the Central Pollution Control Board as a regulator in this regard. This leaves a huge legislative vacuum for chemicals which are not hazardous by nature but owing to the lack of standards to ensure its safety turns harmful. In the absence of the requisite legislative infrastructure, it poses a serious problem for the chemical products manufactured in India to be compliant with European Union’s REACH(Registration, Evaluation, Authorisation and Restriction of Chemicals).
- (iii) **Need for a penal provision centric-approach for non-compliance-** Rule 19 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 provides for serving of an improvement notice by the concerned authority for contravention for any of the obligations under the Act. This does

not provide for penal sanctions in case of non-compliance. Incorporation of penal sanctions in terms of revocation or suspension of licenses will ensure maximum compliance by chemical manufacturing companies.

- **Need for collation of Independent and Updated Statistics**

In order to ensure regulation of a particular sector, it requires the understanding of the deep and profound impact it creates on the country. With respect to statistics related to the chemical sector in particular, the information pertaining to numerous indicators are based on reports prepared by corporate giants. This raises questions as to the accuracy of these reports. The lack of enforceability of the National Chemical Policy coupled with the inadequacy of independent updated statistics calls for a need to collate sufficient data with requisite indicators to ensure the comprehensive understanding of the industry as a whole.

- **Lack of adequate hazardous waste treatment and management facilities**

Though there was scanty awareness about the consequences of hazardous industrial waste, it took a series of devastating incidents for the nation to finally wake up from its slumber and take an awakening interest in this problem. India faces significant environmental challenges associated with the proper treatment and management of waste. The subject of industrial/chemical waste particularly has reached a place of highest importance when it boils down to waste management and sanitary regulation. The fact that many States do not have a TSDF's put in place signifies the need for positive steps to be taken to handle hazardous wastes.

- **Inefficiency of Statutory bodies**

The Central as well as the State Pollution Control Boards have faced challenges in implementing their policies and protocols. There are no standard inspection and sampling procedures prescribed in the Water Act, Air Act or EPA, or other regulations and the CPCB and SPCBs have not issued uniform guidelines.⁵¹ The Environmental Impact

51 Organisation for Economic Cooperation and Development (OECD). Environmental Compliance and Enforcement in India: Rapid Assessment. 2006 , 9 [OECD].

Assessment is one such protocol that is used as a device to determine environmental, social and economic impacts of a project prior to taking a decision on its implementation and mitigation of harmful impacts and maximizes the beneficial effects. The EIA process involves many steps such as Screening, Preliminary Assessment, Scoping, and the final assessment of public hearing and appraisal. But there is an absence of an independent Institutional setup to conduct and monitor EIAs and management plan implementation, absence of cumulative EIA provisions in the law, absence of effective quality control of EIA process.

Additionally, SPCBs have no deterrent mechanisms such as fines or penalties that could be imposed on non-complying industries.⁵² Chapter 3, the Wastes Management Rules do in fact allow SPCBs to impose civil fines on occupiers and operators if they violate provisions of the Hazardous Wastes Rules. An SPCB must, however, get approval from the CPCB before it imposes the fine. This approval process can be difficult and time consuming, which may be the reason that one study found that few SPCBs use this provision.

- **Lack of demarcation of landfills for treatment facilities-**

The Waste Management Rules 2016 relies on a compliance-based approach to regulate demarcation of land for the purpose of landfills and the onus is upon the occupier to ensure the treatment of chemical wastes. The absence of governmental intervention leaves this matter solely to the prerogative of the Occupier who may or may not ensure effective waste management.

The Reduce, Re-use and Recycle Paradigm

The concept of Reduce, Re-use and Recycle or 3Rs is an efficient mechanism to minimize the drastic environmental impact of pollution caused by waste. In the realm of chemical and hazardous waste management, practices incorporating the essence of this 'Triple R' regime will facilitate waste minimization.⁵³ It will ensure sustainable

52 Centre for Science and Environment, *Turnaround: Reform Agenda for India's Environmental Regulators*, New Delhi: CSE, 2009 [Turnaround].

53 *Handbook on Chemical and Biological Waste Management*, Centres of Excellence, United Nations Interregional Crime and Justice Research Institute, 2014 page 168.

production and consumption patterns. The 'Reduce' aspect implies a reduction in the amount of waste generated by utilizing items with care.⁵⁴ To reuse means to repeat the use of items or parts of items which still have usable aspects. Recycling means the use of waste itself as a resource. It includes the use, reuse or reclamation of waste residuals or materials of hazardous waste. The reduction in the resources and energy used should yield to a proportional increase in the recyclable materials. Waste minimization can be achieved in an efficient way by focusing on the 3Rs in a chronological order. The waste hierarchy refers to the 3Rs, which classify waste management strategies according to their desirability and prioritize based on their importance. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste. This saves fresh resources exploitation and waste generation quantity. It facilitates economic feasibility by saving fresh resources from being exploited and is socially acceptable. By implementing measures on both the production and consumption sides, countries may be able to reduce (per unit of product) both the quantity of the resource extraction stream and the quantity and environmental impact of the residual materials flow that ultimately reaches disposal sites.⁵⁵

In a world entrapped in the snares of accelerating economic development, environmental degradation is an inevitable and fatal consequence. It is no secret that economies striving towards a growth-oriented paradigm are likely to become incompatible with the idea of ecological sustainability simply because a rising industrial sector means more harm to the environment. The importance that the Industry has assumed over the years in India in terms of a contributor to the economy shows that it cannot be done away with. At the same time, the effect that the industry has on the environment in terms of the pollution

54 National 3RStrategy for Waste Management, Department of Environment, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, December 2010 page 3, Available at: http://www.indiaenvironmentportal.org.in/files/national_3r_strategy.pdf (Last accessed on November 19, 2019).

55 Reduce, Reuse and Recycle (the 3Rs) and Resource Efficiency as the Basis for Sustainable Waste Management, United Nations Centre for Regional Development, 2011, New York page 5, Available at: https://www.un.org/esa/dsd/csd/csd_pdfs/csd19/learningcentre/presentations/may%209%20am/1%20-%20learning_centre_9may_ppt_mohanty.pdf (Last accessed on November 19, 2019).

cause by it cannot be ignored. Therefore, devising a regulatory framework for the industry to meet the needs of its economic growth while keeping the drastic environmental impact to the minimum calls for a sustainable approach. The constant tussle between environment and development cannot come in the way of the need for regulation of the use of chemicals by virtue of the inherent characteristics of chemicals which has the propensity to be harmful. The sheer magnitude and volume of production and consumption of chemical products is growing at a pace which calls for regulation in this Sector.

4.9 INTERNATIONAL TRADE IN CHEMICALS AND THE INDIAN POSITION

The basic economic concept called Trade is of buying and selling of goods and services. When such trade is undertaken between countries it is termed as international trade. Chemical waste or hazardous wastes, are wastes which is said to pose a threat to human health or environment; such wastes would also require special care when being transported, stored, treated or disposed. Back in 1992 the chief economist of the World Bank, Lawrence Summers, had written in an internal memo⁵⁶ questioning as to whether or not it would be a good decision to dump toxic wastes in low wage and low population density countries. The inherent meaning behind this request was that such countries would have an increased degree of tolerance towards environmental hazard as the number of people affected by such environmental risks would be less, not to mention the low income of the majority of the population indicating a decreased economic value of human life and health.⁵⁷ Toxic wastes, as per the law of comparative advantage⁵⁸, needs to be stored and treated in a low-income-under-populated country.⁵⁹

56 Economist, 1992, Let Them Eat Pollution, 8 Feb 1992, 66.

57 Thunen Michael Rauscher, Series of Applied Economic Theory - working paper no. 19: International Trade in Hazardous Waste.

58 Comparative advantage: when one nation's opportunity cost of producing an item is less than another nation's opportunity cost of producing that item. A good or service with which a nation has the largest absolute advantage (or smallest absolute disadvantage) is the item for which they have a comparative advantage, Glossary, Bureau of Labor Statistics, United States Department of Labor, Available at: <https://www.bls.gov/bls/glossary.htm#c> (Last accessed on 8 November, 2019).

59 So the number of people affected by an environmental risk of such dumping would be low.

Free trade is where countries agree to reduce trade barriers⁶⁰ and facilitate free movement of goods and services with little or no government tariffs, quotas, subsidies etc. therefore it is a voluntary exchange and the benefits to have international division of labor improves the production factors and increases productive utilization. However, when it comes to trade in chemical wastes it is often argued that international trade in hazardous substances would result in an imbalanced economic exchange between Global North and the Global South,⁶¹ in the sense that the industrialized developed countries would be exporting their domestic wastes and in turn their environmental complications to a developing non-industrialized country which would have already been facing a problem in processing and disposal of hazardous substances. So the proponents of this argument suggest that there needs to be a complete ban on the trade of these chemical and hazardous wastes which would compel the developed countries into either steer clear of generation of such wastes completely or evolve environmentally sound means of disposal.

In actuality, however, international trade in hazardous waste is highly regulated⁶² and in some cases restricted.⁶³ An international instrument that is of prime importance in this regard is the 'Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and its Disposal'⁶⁴ (Basel Convention). This convention forbids private transactions in chemical and hazardous waste and also prohibits exports of countries who are not a party to this convention; further in certain special situations the convention

60 Free Trade – Economics, Encyclopaedia Britannica, Available at: <https://www.britannica.com/topic/free-trade> (Last accessed on 8 November 2019).

61 Vincenzo di Nicola, the Global South: an Emergent Epistemology, Available at: https://www.academia.edu/36591955/the_global_south_the_global_south_an_emergent_epistemology (Last accessed on 8 November 2019).

62 Stockholm Convention; Rotterdam Convention; Basel Convention; Minamata Convention.

63 Annex 6. List of chemicals banned or severely restricted to certain uses owing to their effects on health and the environment in the countries of EU, International Labour Organization, Available at: <https://www.ilo.org/legacy/english/protection/safework/cis/products/safetytm/clasann6.htm> (Last accessed on 8 November 2019).

64 Basel Convention & Basel Protocol on Liability and Compensation.

suggests that the exported wastes and substances would have to be re-imported into the country of origin.⁶⁵

4.9.1 INDUSTRIAL GROWTH AND CLASSIFICATION

‘The World Counts’ organization statistics of the tons of hazardous waste thrown out globally as on 8.11.2019 stands at 343,243,100 and its increasing by the second.⁶⁶ The generation of waste has to have a source and this section explores the source for the generation of the chemical wastes around the world.

The Indian Ministry of Environment, Forest and Climate Change (MoEFCC) in 2016 developed a criterion to categorize the industries in India based on the Pollution Index. The pollution Index, PI, would be any number between 0 and 100 and the closer an industries PI to 100 the higher the degree of pollution load from it.⁶⁷ The CPCB, SPCB and MoEFCC together has classified most of the chemical manufacturing and waste generating industries in the ‘Red Category’ which indicates that the industries under this sector has a pollution index of 60 and above.⁶⁸ To broadly categorize the industries which produce chemical wastes are:

65 Basel Convention: Article 8: duty to re-import:

[When a trans-boundary movement of hazardous wastes or other wastes to which the consent of the states concerned has been given, subject to the provisions of this convention, cannot be completed in accordance with the terms of the contract, the state of export shall ensure that the wastes in question are taken back into the state of export, by the exporter, if alternative arrangements cannot be made for their disposal in an environmentally sound manner, within 90 days from the time that the importing state informed the state of export and the secretariat, or such other period of time as the states concerned agree. To this end, the state of export and any party of transit shall not oppose, hinder or prevent the return of those wastes to the state of export.] Available at: <https://www.basel.int/portals/4/basel%20convention/docs/text/baselconventiontext-e.pdf> (Last accessed on: November 19, 2019).

66 Hazardous Waste Statistics, the World Counts, Available at: https://www.theworldcounts.com/counters/waste_pollution_facts/hazardous_waste_statistics. (Last accessed on November 19, 2019).

67 Environment Ministry releases new categorisation of industries. (5-march-2016) Press Information Bureau, GoI, Available at: from: <https://pib.gov.in/newsite/printrelease.aspx?relid=137373> (Last accessed on November 8, 2019).

68 *Ibid.*

- Auto repair shops: with their constant oil changing ritual, paint, engine lubricant etc;
- Printing industries: with their use of ink and photography equipment;
- Metal-works industry: using acid based chemicals and water based sludge producing, in some cases, cyanide waste;
- Dye industry: manufacturing to further use in paper, textiles and such other industries and using copper, chromium, sulfuric acid etc to prepare the dyes;
- Chemical manufacturing industry: making plastics, paints, explosives, dyes, pharmaceuticals, petrochemicals etc.
- Lead-acid battery industry: making rechargeable batteries and the pile up of unused batteries making its way to be up-cycled.

Besides these it would only seem discourteous to ignore the plastic manufacturing industries as one of the producers of chemical waste and it would be appropriate to assume that most of the industries these days would produce some form of chemical waste during the process of their manufacture. In India the number of polluting industries are said to have doubled between 2011 and 2018.⁶⁹ Lack of statutorily required safety standards and insufficient training of the workers would result in use of crude methods to handle toxic waste leading to such toxic wastes contaminating the nearby air and water resources putting nearly millions of people around such industries at risk. Interestingly many countries around the world have a registry system for such industries to obtain a license if they are to deal with any such chemicals.⁷⁰ India has proposed to

69 Grossly Polluting Industries More than Doubled in 8 years: SOE in Figures, Down to Earth, Available at: <https://www.downtoearth.org.in/news/pollution/grossly-polluting-industries-more-than-doubled-in-8-years-soe-in-figures-64962> (Last accessed on 8 November, 2019).

70 Waste: Guidelines & References, Environmental Protection Department, the Government of Hong Kong. Available at: https://www.epd.gov.hk/epd/english/environmentinhk/waste/guide_ref/ref_cw.html (Last accessed on 8 November 2019).

have a registry for chemical producing industries through its National Action Plan on Chemicals.⁷¹

4.9.2 ARGUMENTS FOR AND AGAINST INTERNATIONAL TRADE IN CHEMICAL AND WASTES

International trade in general is considered to be advantageous to all the countries involved. The simple reason would be that there would not be an agreement to trade in case parties involved would not be acting in self-interest to benefit from such a trade. However, expecting free trade especially in the case of chemical and hazardous wastes would be considered naive. Therefore there will be economic situations where barriers to trade have been in place and the removal of these barriers would result in loss of welfare of the parties involved. Therefore, if one has to assume that there are no transport externalities and pollution spill-overs then this would result in a regulatory deficit in waste disposal industries of the importing countries and becomes beneficial to the exporters of toxic waste thereby harming the importers as they lose out on welfare from trade liberalization resulting in a negative trade in international trade perspective.

The supporters of international trade in chemical wastes view the situation through an economic and financial lens. They argue that since the liberalization of trade and introduction of free trade between the countries it would be impractical to criticize trade in chemical waste as free trade is based on voluntary exchange between countries and that they would not be tying themselves together if it were not beneficial to the parties involved. Further the international division of labor results in increased ability to allocate as it facilitates the production factors to a most productive utilization of resources. Therefore they conclude that that international trade in chemical waste would be beneficial. This stand supporting profit maximization was demonstrated through an article published in Cato Journal in 2007⁷² which argues that there is small evidence of the fact that death

71 Sunny Lee, India Draft Chemical Plan Possible Early 2019, Chemical Watch – Global Risk and Regulation News. Available at: <https://chemicalwatch.com/72436/india-draft-chemical-plan-possible-early-2019#overlay-strip> (Last accessed on 8 November, 2019).

72 Jay Johnson, Gray Pecquet & Leon Taylor, Potential Gains from Trade in Dirty Industries: Revisiting Lawrence Summers' Memo, Available at: <https://www.cato.org/sites/cato.org/files/serials/files/cato-journal/2007/11/cj27n3-6.pdf> (Last accessed on 8 November 2019).

rates in developing countries has increased due to such trade and that developing countries and its people weigh the increased opportunities to business and productivity more than the hazards created by the pollutants due to trade in chemical wastes. Increase in the economic development and profits of the developing countries and that of the global south seems to be the central focus of the arguments for the international trade in chemical wastes.

On the other hand the critiques of this trade feel that as ideated by Lawrence Summers, the current trend in the world trade has resulted in 'Toxicomania colonialism'.⁷³ The term coined in 1992 by Jim Puckett of Greenpeace referring to the dumping of industrial wastes of the Global North countries into that of the Global South.⁷⁴ This, it is argued, is a result of the lack of regulation and weak policies turning the countries of the global south into toxic dumping yards of the countries of the global north. It is pointed out that the producers of these chemical wastes rarely suffer the negative health effects from having to had to deal with disposing them and that the burden has been passed on to the workers and individuals of the poorer countries. In one of his research papers Professor Reed argues⁷⁵ that the western cultures has always viewed the developing and indigenous land as underdeveloped and less civilized and therefore forge to transfer their harmful wastes into those lands drawing a correlation between actual colonialism and that of toxic colonialism.

4.9.3 INTERNATIONAL INSTRUMENTS REGULATING TRADE IN CHEMICAL WASTE

The international conventions and the Indian national stand with regard to trade in chemical wastes is not that of a blanket ban on the import and export of these substances, but to restrict in international trade of select category of hazardous wastes and setting

73 Laura A. Pratt, Decreasing Dirty Dumping? aRe-evaluation of Toxic Waste Colonialism and the Global Management of Transboundary Hazardous Waste, 35 WM. & Mary Envtl. L. & Pol'y Rev. 581 (2011) Available at: <https://scholarship.law.wm.edu/wmelpr/vol35/iss2/5> (Last accessed on 8 November, 2019).

74 Tam Dalyell, Thistle Diary: Toxic Wastes and Other Ethical Issues - Comment from Westminster, News Scientist (4 July 1992), Available at: <https://www.newscientist.com/article/mg13518285-900-thistle-diary-toxic-wastes-and-other-ethical-issues-comment-from-westminster-by-tam-dalyell/> (Last accessed on 8 November 2019).

up a precondition permitting of such import and export of wastes after securing that such wastes would be handled in a safe environment and in an environmentally viable means and methods of treatment and disposal.

International trade, in more situations, take place through the sea route and this has been the practice since the times of the first voyage through sea.⁷⁶ These trade practices involve the usage of ships and ships would often indulge in dumping⁷⁷, spillage and oil pollution⁷⁸. To keep this in check the International Convention for the Prevention of Pollution from Ships came into being in 1973 which was later modified into a Protocol i.e. MARPOL 73/78.⁷⁹ This protocol had the nations, through their national ship registry of such ships at sail, responsible for their actions regardless of where they set sail. This in a way gave the countries an authorization to monitor as to how, what and where the cargo of the ships would be carried and their fate.

In 1986 a cargo ship named Khian Sea was carrying 14,000 tons of waste incinerator ash to be shipped out of its origin territory. After being repeatedly refused by many countries to accept the consignment of this ship, the crew dumped the same in the sea in 1988 despite the fact that MARPOL was already in existence; this incident lead to the Basel

75 T.V. Reed, Toxic Colonialism, Environmental Justice, and Native Resistance in Silko's 'Almanac of the Dead' MELUS vol. 34, no. 2, Ethnicity and Ecocriticism pages. 25-42 (2009).

76 Peter. N. Stearns; William L. Langer, the Encyclopaedia of World History: Ancient, Medical, and Modern, Chronologically Arranged. Houghton Mifflin Company (2001).

77 Inventory of Radioactive Waste Disposal at Sea, International Atomic Energy Agency (IAEA), Available at: https://www-pub.iaea.org/mtcd/publications/pdf/te_1105_prn.pdf (Last accessed on 10 November, 2019).

78 Bella Bathurst, the Wreckers: a Story of Killing Seas and Plundered Shipwrecks, from the 18th Century to the Present Day, page 140, Available at: https://books.google.co.in/books?id=2cwsxl3adpkc&printsec=frontcover&vq=%22shipwrecks+of+the+isles+of+scilly%22&source=gbs_citations_module_r&cad=6#v=onepage&q=%22shipwrecks%20of%20the%20isles%20of%20scilly%22&f=false (Last accessed on 10 November, 2019).

79 International Convention for the Prevention of Pollution from Ships (MARPOL), International Maritime Organization, Available at: [http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-\(marpol\).aspx](http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx) (Last accessed on 10 November, 2019).

convention coming into existence.⁸⁰ This convention created the opportunity for the countries of the world to ideate and conceive an international instrument on trans-boundary movement of hazardous waste i.e. Basel convention which came into effect in 1992.

Subsequent to Basel convention a multilateral treaty, in 1998, which checked the responsibilities of the countries with respect to importation of hazardous chemicals was entered into i.e. the Rotterdam convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.⁸¹ This convention needed the exporters to suitably and adequately label the hazardous materials that are being exported.⁸² Rotterdam convention majorly contains the list of substances that requires to be labelled in case of international trade in them. Meanwhile the Stockholm Convention on persistent organic pollutants came into being in 2004⁸³ which aimed at eliminating or restricting production and use of persistent organic pollutants. This convention not only listed substances that it aims to eliminate or restrict but it also provided for financial support from the developed countries to eliminate or restrict the use of listed chemical and effectively manage their disposal.⁸⁴ The above mentioned three conventions namely, Basel, Rotterdam and Stockholm, later had joint managerial functions for their Secretaries.⁸⁵

80 William P. Cunningham & Mary Ann Cunningham, Principles of Environmental Science, McGraw-Hill GurthierEducation, chapter 13: Further Case Studies, Available at: http://highered.mheducation.com/sites/0072919833/student_view0/chapter13/additional_case_studies.html (Last accessed on 10 November, 2019).

81 The Rotterdam Convention, Available at: <http://www.pic.int/theconvention/overview/textoftheconvention/tabid/1048/language/en-us/default.aspx> (Last accessed on 10 November, 2019).

82 Article 13: Information to Accompany Exported Chemicals, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Texts and Annexes (revised in 2017) United Nations Environment Program (UNEP) and Food and Agriculture Organization of UN (FAO).

83 Stockholm Convention on Persistent Organic Pollutants, Available at: <http://www.pops.int/theconvention/overview/textoftheconvention/tabid/2232/default.aspx> (Last accessed on 10 November, 2019).

84 Article 13: Financial Resources and Mechanisms, Stockholm Convention on Persistent Organic Pollutant, Texts and Annexes (revised in 2017) (UNEP).

85 Synergies Among the Basel, Rotterdam and Stockholm Conventions, Available at: <http://www.brsmeas.org/home/tabid/813/language/en-us/default.aspx> (Last accessed on 10 November, 2019).

As part of the Indo-German Bilateral agreement and Indo-German Cooperation in Science and Technology⁸⁶ there has been a project on strengthening of Central and State Pollution Control Boards. Under this bilateral agreement an Indo-German centre for sustainability (IGCS) has been established at IIT Madras along with German universities which, along with other things, also work towards sustainable waste management. Under the said project there had to identification and categorization of the hazardous wastes and to develop a national framework to dispose such wastes thereby developing guidelines to issue license to such facilities and to establish cooperation between different waste management authorities in India.

Having a sound and conscious trade begins with a robust legislation and to support this in 2015 the UNEP i.e. the United Nations Environment Program has come with a UN Environment Guidance on the Development of Legal and Institutional Infrastructures and Measures for Recovering Costs of National Administration for Sound Management of Chemicals; this in short are called the LIRA Guidance. These guidelines aim at providing support for nations in framing legislations and for institutional set-ups to have sound management of chemicals. This was followed by 'Guidance on chemical control contributing to national progress and safety' in 2015 to assist governments in implementing the LIRA guidelines.

Bamako convention, an African Union convention, came into being as a response to Article 11 of the Basel Convention⁸⁷. This convention aims at protecting the African countries against the exports of the toxic wastes from the developed nations. Including this there are 9 other conventions that have been entered into by various countries.⁸⁸

86 Brief on Indo-German Cooperation in Science & Technology, Available at: <https://www.indianembassyberlin.gov.in/pdf/indo-german%20brief%20for%20january%202019.pdf> (Last accessed on 10 November, 2019).

87 Freedom to Parties of the Basel Convention to Enter into Regional Agreements.

88 Bilateral, Multilateral and Regional Agreements and Arrangements, Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, Available at: <http://archive.basel.int/article11/multi.html> (Last accessed on 10 November, 2019).

4.10 INDIAN REGULATIONS

One of the focuses of the Indian Foreign Trade Policy (2015-2020), among others, is to support chemical markets with a concentration to strengthen the South Asian community.⁸⁹ Further the policy states that India along with negotiating with the Trade and Economic Partnership Agreement (TEPA) and the EFTA countries i.e. Iceland, Norway, Switzerland and Liechtenstein, has plans to engage with Turkey and Visegrad-4⁹⁰ and other non-EU countries to encourage trade in organic chemicals among other things.⁹¹ The policy also looks at improving trade connectivity amongst the SAARC countries and trade in chemicals is one among the focused industries.⁹² On the impact analysis the policy mentions that the preferential imports of intermediate goods into India through Foreign Trade Agreements (FTA) has benefited through an increase in manufacturing activities. The prime function of the Directorate General of Foreign Trade constituted under the Foreign Trade (Development and Regulation) Act, 1992 is to implement the Exim or the Foreign Trade Policy⁹³ and therefore becomes the authority to implement the above mentioned Foreign Trade Policy regulations on Chemicals and their trade between India and other countries.

The other Indian legislation that majorly concerns with trade in chemical wastes is the Hazardous and other Wastes (Management and Trans-boundary Movement) Rules, 2016. The core objectives of these rules are to recycle, reprocess and reuse of hazardous wastes by setting up Treatment Storage and Disposal Facility (TSDF). The Import of wastes under these Rules are only permitted for reuse or recycle or reprocessing with prior permission of the Ministry of Environment, Forest and Climate Change and/or Directorate General of Foreign Trade.⁹⁴ These Rules, for the first time, distinguished between

89 Foreign Trade Policy (2015-2020) Available at: <https://dgft.gov.in/foreigns-trade-policy-2015-20-> (Last accessed on 10 November, 2019).

90 Czech Republic, Hungary, Slovak Republic, Poland.

91 *Supra* note 89 at 35.

92 *Ibid.*

93 About the Directorate General of Foreign Trade, Available at: <https://dgft.gov.in/about-us/about-dgft> (Last accessed on 10 November, 2019).

94 Environment Ministry Notifies Hazardous Waste Management Rules, 2016, Press Information Bureau, Government of India, Available at : <https://pib.gov.in/newsite/printrelease.aspx?relid=138521> (Last accessed on 10 November, 2019).

Hazardous Waste and other wastes along with simplifying the procedure by merging the approvals into a single window clearance to set up waste disposal facilities. The new rules have also streamlined and simplified the document based process to import-export of waste; the rules have also given out the list of waste regulated for import and export. Further the HW Rules has prohibited the import of chemical wastes particularly the ones in the solvent form.⁹⁵

With a reference made to Annexure 8 of the Basel Convention, Part A of Schedule 3 mentioned under Rules 3, 12, 13, 14, 17(3) of the HW Rules, 2016 mentions about the list of hazardous wastes that can be imported into India only upon prior consent; whereas Part B of the said Schedule lists those wastes trading in which would not require a prior consent. Part C – list of hazardous characteristics, Part D List of wastes the trade of which would not require permission from the Environment Ministry. Schedule 6 as mentioned under Rules 12 and 14 contain the list of hazardous and other wastes that are prohibited from import into India. And the list of documents that are to be verified by the Customs authorities for import of wastes is given under Schedule 8 as mentioned under Rule 13(2) &(4). Schedule 7 under Rule 13(6)⁹⁶ and Rule 21⁹⁷ of the HW Rules, 2016 mentions the authorities who are concerned with the management of Hazardous and other wastes. Accordingly,

- Ministry of Environment, Forests and Climate Change under the Environment (Protection) Act, 1986 are the authorities who issue permission to exporters and importers of wastes.
- State pollution control boards or the Pollution Control Committees constituted under the Water (Prevention and Control of Pollution) Act, 1974 are the authorities

95 *Ibid.*

96 Rule 13(6): The Ministry of Environment, Forest and Climate Change shall forward a copy of the permission to the concerned Port and Customs authorities, Central Pollution Control Board and the concerned State Pollution Control Board for ensuring compliance with respect to their respective functions given in Schedule VII.

97 Rule 21: Responsibility of Authorities.-the authority specified in column (2) of Schedule VII shall perform the duties as specified in column (3) of the said schedule subject to the provisions of these rules.

who examine the applications for imports submitted by the importers and forwarding the same to the above said Ministry.

- The Directorate General of Foreign Trade constituted under the Foreign Trade (Development and Regulation) Act, 1992 are the authorities who grant licenses for the import of hazardous and other wastes; And to refuse license for such wastes whose import and export has been prohibited.

Besides these, Rule 10 of the Ozone Depleting substances (Regulation) Rules, 2000 prohibits the import and export of any products which are made or are likely to contain ozone depleting substances unless such importer or exporter obtains license from the authorities and such product is properly labelled.

Indian regulations are required to be followed by the traders engaging in Exim trade in India. The traders considering these regulations as hindering or delaying their trade in chemical wastes to and from India have an international instrument in place. In so far as barriers to international trade in chemical wastes are concerned, the anti-dumping duty imposed by the domestic government on the imports from a foreign country secures a prime position. The reason for imposition of an anti-dumping duty is to curtail the exporting company from selling a product at a lower price than that of the same products in the importing country thereby hampering the domestic market. The World Trade Organization 'Anti-dumping Agreement'⁹⁸ is one such international agreement which focuses on directing as to how a country should or should not react to a dumping activity. Article 6 of GATT⁹⁹ also provided for anti-dumping measures. India has taken this prudent measure several times in the past and continues to take them in the interest of domestic trade. The procedure of imposing such duties can be done in two ways:

98 Agreement on Implementation of Article VI of the General Agreement on Tariffs and trade 1994, Uruguay Round Agreement, World Trade Organization, Available at: https://www.wto.org/english/docs_e/legal_e/19-adp_01_e.htm (Last accessed on 10 November, 2019).

99 *Ibid.*

- One, where the government takes a *suo moto* decision to impose such duty;
- Second, after investigating an application filed by a company so affected by such unfair competition.

Such anti-dumping measure related to chemicals has been imposed in the past few years as follows:

- In 2017 the Directorate General of Trade Remedies (earlier known as Directorate General of Anti-dumping and Allied Duties) under the Department of Commerce, Ministry of Commerce and Industry, had imposed an anti-dumping duty of 60.35 \$ per tonne for five years to protect domestic players from dumping of ‘ammonium nitrate’ from Russia, Indonesia, Georgia and Iran.
- In November, 2018, the Ministry of Commerce recommended the continuation of anti-dumping duty on import of ‘Methylene Chloride’, a chemical used in pharmaceutical and agricultural industries, from the United States of America and the European Union countries. This duty was initially imposed in 2014 and on upon investigation from January-December, 2017, it was found that the domestic market still suffers from the dumping of these chemicals into India.¹⁰⁰

As a forward looking strategy the Ministry of Environment, Forest and Climate Change has formed a National Coordination committee to draw up a National Action Plan for Chemicals as part of the World Bank-aided Capacity Building for Industrial Pollution Management Project.¹⁰¹ This action plan would address the production, import and consumption of chemicals in terms of a policy framework for registration of chemicals, to stop chemicals which pose a threat to human health and the environment, developing infrastructure for analysis of chemicals and their effects on users, revising current and

100 Notification no.38/2018-customs (Add), Available at: <http://www.cbic.gov.in/resources//htdocs-cbec/customs/cs-act/notifications/notfns-2018/cs-add2018/csadd38-2018.pdf>; jsessionid=9c41b0f9071c8e94f26975ca0267fc6a (Last accessed on 10 November, 2019).

101 India Draft Chemical Plan Possible Early 2019, Chemical Watch Global Risk and Regulation News, Available at: <https://chemicalwatch.com/72436/india-draft-chemical-plan-possible-early-2019#overlay-strip> (Last accessed on 10 November, 2019).

existing legislation, involving India in more international programs and agreements. This draft National Action Plan for Chemicals was said to set up a REACH like database¹⁰² for India and is said to have been published for public comment in the first quarter of 2019. It would be benefitting India immensely in the sense that which is said to follow the Globally Harmonized System of classifying, labelling and packaging standards by setting up new Hazardous Chemical Management Rules which has been draft law since 2011; this Action plan seeing the light of the day would boost India a step ahead in developing on par with the global standards by having to maintain its own national inventory of chemicals which would facilitate easy management and regulation of chemicals and wastes in the country.

Despite these conventions and legislations being in place there has been several instances where countries have dumped hazardous substances into the borders of another country in the pretext of international trade. The scenarios are discussed below.

The case of Italy and Nigeria

Africa has always been considered as the poorest of the countries with its feeble regulations and implementation and a strong reputation of being exploited by the developed countries from centuries together. Therefore the continent and its countries becoming victims of 'toxic colonialism' was not a surprise. An Italian company on one occasion dumped 4000 tons of toxic waste containing over a 100 tons of polychlorinated biphenyls into a Nigerian village by falsely labelling the package as fertilizer; thereby resulting in the death of a number of those villagers due to consumption of rice grown from the water contaminated by those chemicals which made its way into a nearby flowing river. However, this situation was said to have been remedied by the coming together of the environmental non-governmental organizations (NGOs) with that of the State players in the 1980s were successful in bringing about a ban on waste trade to a certain extent between Organization for Economic Cooperation and Development (OECD) countries and non-OECD countries.¹⁰³

102 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) established European Chemicals Agency.

103 Jennifer Clapp, African, NGOs, and the International Toxic Waste Trade, the Journal of Environment & Development (Vol 3, Issue 2, 1994) page 17-46.

Ship-breaking industry

The global south has been a hot-spot for ship-breaking. Ship-breaking refers to a way to dispose of old and worn-out ships by way of demolition by breaking it up into parts and thereby selling or utilizing the same for different industrial application and in some cases to recycle them.¹⁰⁴ Asian countries particularly Bangladesh, India, China, Pakistan, Turkey etc have been the top choices among the developing countries to engage in these activities. This activity dates back to the 80s when the British ships were scrapped after years of service and continues till date.¹⁰⁵ The trend majorly has been that the industrialized countries wanting to get rid of an old ship looking to pass on the burden to not deal with the effects of such process would sell those ships to developing countries; in the garb of good business, the traders of the developing countries usually accept the deal despite the old ships containing harmful substance and chemicals like asbestos, mercury, arsenic etc and providing suitable gear to the workers who are involved in such ship breaking is another cause of concern. A Supreme Court of India judgment in the *Clemenceau ship breaking case*¹⁰⁶ would more accurately demonstrate this situation.

Alang in Gujarat which has been reputed to be one of the world's largest ship-breaking yards¹⁰⁷ has constantly been in the news for its controversial choice of dismantling ships that pose a threat to the environment and the workers there. In 2005 despite the Dutch Environment Ministers writing to the then Minister, A Raja, to deny permission to dismantle a Dutch fugitive ship it is said that the request was denied.¹⁰⁸ Following this in

104 Ship-Breaking: a Hazardous Work. International Labor Organization, Available at: https://www.ilo.org/safework/areasofwork/hazardous-work/wcms_110335/lang-en/index.htm (Last accessed on 10 November, 2019).

105 World War 1 at Sea, the British Shipbreaking Industry in Outline, Available at: <http://www.naval-history.net/ww1navybritish-shipbreak.htm> (Last accessed on 10 November, 2019).

106 Research Foundation for Science, Technology and Natural Resource Policy vs. Union of India & Ors, Dt:6/7/2012 (W.P. no. 657 of 1995).

107 10 Largest Ship Graveyards in the World, Available at: <https://www.marineinsight.com/category/environment/amp/> (Last accessed on 10 November, 2019).

108 Surabh Yadav, a Toxic Ship Comes Ashore, (2018), Available at: <https://www.thehindubusinessline.com/blink/know/a-toxic-ship-comes-ashore/article8309858.ece#> (Last accessed on 10 November, 2019).

2006 the Supreme Court of India appointed a High-Powered Committee¹⁰⁹ to make recommendations regarding the hazards associated with the ship breaking industry; the committee's recommendations were on the line of the international conventions like Basel and Rotterdam and also directed that the Government of India formulate a Code to incorporate the recommendations of the Committee. Further the court in the said case decided to deny permission to a French aircraft carrier ship *Clemenceau* as it contained huge amounts of asbestos in it and Alang did not have sufficient infrastructure and does not follow safety measures while handling these harmful substance.¹¹⁰ This was followed by the French Supreme Court recalling the ship.¹¹¹ This was again facilitated by the join work of various NGOs around the world and in India. Despite the Supreme Court of India Judgment and the monitoring committee in place there has been ships coming in since 2006 (*SS Blue Lady*),¹¹² 2010 (*SS Platinum II*).¹¹³ However, following this several ships have been denied permission to enter Indian coasts like the *Oriental Nicety* and *Exxon Valdez*.

With all these regulations in place one of the reasons as to why recyclers import waste would be that they do not get enough waste in the country, which would be hard to believe with the amount of garbage generated by Indian cities. As on 2015 the Ministry of Environment, Forests and Climate Change has detected 5 cases of import of hazardous waste¹¹⁴ of which the recent ones being the customs officials seizing containers carrying around 500 tonnes of municipal wastes along with chemical wastes such as batteries etc

109 *Supra* note 106.

110 *Ibid*.

111 *Ibid* at 54.

112 Toxic Ship *Blue Lady* to be Allowed into Indian Waters, the Maritime Executive, Available at: <https://www.maritime-executive.com/article/2006-06-14toxic-ship-blue-lady-to-be-allowed-int> (Last accessed on 10 November, 2019).

113 Central Team Begin Inspection of Ship *Platinum II* Near Alang, The Hindu. Available at <https://www.thehindu.com/sci-tech/central-team-begin-inspection-of-ship-platinum-ii-near-alang/article16887636.ece> (Last accessed on 10 November, 2019).

114 See also https://commerce.gov.in/writereaddata/uploadedfile/moc_635975494541653787_ls20151214.pdf. (Last accessed on 10 November, 2019).

labelled as paper consignment. The importer was never the less penalized.¹¹⁵ The customs are highly understaffed and under equipped to check thousands of containers that arrive regularly across the ports in India. Ultimately the issue involves both law and environment and also the essence of protecting a countries domestic market and its players or forging for a bigger market share for their countries products and substances outside their boundaries. The conduct of the countries and its traders towards the rules and regulations would determine the equity between the countries and maintain harmony between trade and environment.

115 See also <https://www.downtoearth.org.in/coverage/single-window-dumpyard-328>. (Last accessed on 10 November, 2019).

INDIAN REGULATIONS ON CHEMICAL AND HAZARDOUS WASTE MANAGEMENT

5.1 BACKGROUND

In the present times, the use of chemicals is indispensable for the growth of any economy since it impacts almost all spheres of human activity. It is the mainstay of several sections of the economy and contributes largely for the growth of the industrial and agricultural sector by providing raw materials for a number of industries, including textile, paper, paint, soap and detergent, pharmaceutical, bulk drugs and formulations, agrochemicals such as insecticides, pesticides, fertilisers etc. Besides use of imported chemicals in different industries, the chemical sector is an industry in its own right producing a wide range of products such as inorganic chemicals, synthetic organic chemicals like drugs and pharmaceuticals, dyes and intermediates, pigments, fine and specialty chemicals, chlor-alkali, pesticides, colorants and alcohol based chemicals, etc. India ranks sixth in the world in the production of chemicals and fourth in the production of agro-chemicals. India accounts for 16 per cent of the dye stuff and dye intermediaries and is a global supplier of dyes. Excluding pharmaceutical products, the chemical industry ranks 14th in global exports, employs more than 2 million people and its value is expected to rise to 304 billion dollars by 2025.¹

The sheer magnitude of the Indian chemical industry, the wide spectrum of products manufactured, the allied and dependent sectors using chemicals, the emergence of new chemical products with each passing day and the impact that the industry has on the safety and livelihood of the persons employed in the sector and those working in close contact with chemicals, and its potential to generate hazardous waste makes it incumbent on the state to devise a regulatory mechanism for the chemical industry and the waste

¹ Chemicals, Available at: <https://www.investindia.gov.in/sector/chemicals> (Last accessed on November 19, 2019).

the chemical industry or other allied industries using chemicals generates. In keeping with the requirements of the industry and the challenges it can pose, especially in terms of environmental and health risks, India has a comprehensive legislative framework for the management of chemicals and hazardous chemical waste. Regulations have been enacted for the entire life cycle of chemicals, starting from manufacture, storage, use, handling, transportation, import and export, recycling, disposal and waste management, consumer interest for using chemicals and the protection of the environment and public health.

In addition to the chemical industry, there are a number of other sectors that generate hazardous waste, in most of which chemicals are used in one form or the other. As a result of industrialisation, technology picked pace and started controlling the industries. Growth of software, supported by the hardware i.e., the physical device to use the technology, had to be made out of components which is easy to use and at the same time durable. Metals, plastic, glass and silicon-based materials were most suitable for such products. Discarding these products after use has led to generating several tonnes of wastes everyday worldwide. However, increased dependence on plastic and other non-degradable substances has put the planet under peril. Indiscriminate disposal of these plastic and other waste materials surrounded as landfills, littered in lakes, rivers and oceans are slowly turning out to be a ticking time-bomb. Post the commencement of technological era, focus has shifted from waste disposal to waste handling and management. Classification of these waste substances into Hazardous, Chemical, E-waste, Plastic wastes and Bio-medical wastes has laid down special emphasis on handling and management of these specialised waste substances.

Different ministries are involved in regulating the implementation of the different Acts, Rules and Regulations that govern different aspects of chemical and hazardous waste management and handling. The Environment (Protection) Act, 1986 acts as an umbrella legislation under which most regulations on chemical wastes are framed. Moreover, this legislation links the different multilateral environmental agreements on chemical and waste such as the Basel Convention by formulating rules in pursuance of the obligations that a signatory state has to abide by. The Ministry of Environment, Forest and Climate Change is the nodal Ministry responsible for the implementation of the Environment

(Protection) Act and consequently the Ministry that coordinates with the other ministries for the management of chemicals, especially from the perspective of environmental laws. The Hazardous Substances Management Division of the Ministry of Environment, Forest and Climate Change is the nodal agency that is responsible for the management of hazardous substances to ensure that minimal damage is done to health and environment. The activities of the division are carried out under different thrust areas which include chemical safety in the manufacture, storage and import of chemicals, chemical accidents with special reference to emergency planning, preparedness and response, hazardous waste management, solid waste management, bio-medical waste management, municipal solid waste amongst other measures. The Division is also the coordinating body for the five multilateral environmental agreements to which India is a party namely; the Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their disposal; Rotterdam Convention on Prior Informed Consent Procedure for certain Chemicals and Pesticides in International trade; Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury and Strategic Approach to International Chemicals Management.²

Some of the other important ministries and departments that regulate chemicals and in one way or the other include the Ministry of Commerce and Industry that oversees the export and import of chemicals and the Department of Industrial Policy and Promotion under the Ministry of Commerce and Industry that frames rules on explosives, the Ministry of Labour that is concerned with the occupational health and safety of workers engaged in chemical industries and the Department of Chemicals and Petrochemicals under the aegis of the Ministry of Chemicals and Fertilizers that works as the nodal department for the formulation and implementation of policies and programmes for the overall growth and development of the chemical and petrochemical sector in the country. Other important Ministries and bodies include the Ministry of Agriculture, Ministry of Petroleum and Natural Gas and the Central Pollution Control Board and the State Pollution Control Boards and the National Disaster Management Authority.

2 Waste Management - Hazardous Substance Management System, Available at: <http://moef.gov.in/environment/waste-management/> (Last accessed on November 19, 2019).

With the expanse of the chemical sector, one can only roughly estimate the amount of hazardous waste that is generated in the country. The Ministry maintains an online web based portal - the National Hazardous Waste Information System³ (NHWIS) that gives an overview of the waste management in the country. The NHWIS project developed by Environment and Forest Informatics division of National Informatics Centre (NIC) in consultation with the Hazardous Substance Management Division (HSMD) of the Ministry of Environment & Forests maintains a database that is regularly updated by all the State Pollution Control Boards. The NHWIS built with the objective of maintaining an online database that targets more than 32 thousand waste generating industries contains records of such waste generating units, besides providing information on the status of their compliance to environmental regulations.⁴ As per the information provided by the Central Pollution Control Board, about 7.90 million tonnes of hazardous wastes are annually generated by about 41,523 industries in the country, of which only 3.32 million tonnes is land fillable waste, 0.60 million tonnes is incinerable waste and about 3.98 million tonnes is recyclable hazardous waste.⁵ With the magnitude of waste generated, it becomes imperative for the state to devise appropriate regulations for the management, handling and disposal of hazardous wastes. While there are a number of regulations and legislations that deal with different stages of the production and use of chemicals, the scope of this chapter shall be confined to the Indian rules and regulations that deal with the handling and management of chemicals and hazardous waste.

5.2 THE LEGAL FRAMEWORK ON CHEMICAL AND HAZARDOUS WASTE IN INDIA

5.2.1 MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, 1989

The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 was one of the first rules on hazardous chemicals to be formulated in India under the aegis of the

3 National Hazardous Waste Information System, Available at: <http://nhwis.nic.in/auth/industry/home.aspx> (Last accessed on November 19, 2019).

4 NHWIS - an Integrated Web Based Solution, Available at: <http://nhwis.nic.in/spages/aboutus.aspx> (Last accessed on November 19, 2019).

5 Waste Management, Available at: <http://moef.gov.in/environment/waste-management/>. (Last accessed on November 19, 2019).

Environment (Protection) Act, 1986. These Rules have been subsequently amended in 1994 and 2000 and as the title suggests regulate the manufacture, storage and import of hazardous chemicals in India.⁶ The Rules apply to hazardous chemicals defined under Section 2(e) of the Rules which includes any chemical which satisfies any of the criteria laid down in the Schedules appended to the Rules. It includes chemicals which fulfill the norms stipulated in Part I of Schedule I or listed in Column 2 of Part II of the Schedule; any chemical listed in Column 2 of Schedule II; and any chemical listed in Column 2 of Schedule III of the Rules.

Classification of Hazardous Chemicals

Part I of Schedule I categorizes chemicals under the heads of toxic chemicals, flammable chemicals and explosives and lays down the criteria, physical or chemical properties that a chemical must exhibit to be categorized under any one of the three heads. Toxic chemicals are further subdivided under extremely toxic, highly toxic and toxic. Flammable chemicals are categorized as flammable gases and flammable liquids and flammable liquids are further classified as extremely flammable, very highly flammable, highly flammable and flammable liquids. Part II of Schedule I enlists 684 hazardous and toxic chemicals. Thus, as far as Schedule I of the Rules are concerned, a chemical would be considered 'hazardous' if it either matches the criteria laid down under Part I or is enlisted under Part II of the Schedule.

Schedule 2 enlists 30 chemicals with two sets of threshold quantities for the applicability of different Rules that relate to isolated storage at installations or group of installations belonging to the same occupier where the distance between installation is not sufficient to avoid, in foreseeable circumstances, any aggravation of major accident hazards. Similarly, Schedule 3 enlists 179 chemicals in Part I and 6 categories of chemicals under Part II clubbed under two groups of 'toxic substances', and three groups of 'highly reactive substances, explosive substances and flammable substances' respectively with threshold and quantity earmarked for the applicability of different rules. When any isolated storage

6 The principal rules were published in the Gazette of India vide number S.O. 966(e), dated 27.11.1989 and subsequently amended vide: s.o.115 (e), dated 05.02.1990; GSR 584, dated 09.09.1990; S.O.2882, dated 03.10.1994; and S.O. 57(e), dated 19.01.2000.

and industrial activity of any occupier handles hazardous chemicals equal to or in excess of the threshold quantity⁷ specified in schedule 2 and 3 respectively, they are considered major accident hazards.⁸

Sites where hazardous chemicals are dealt with: Important terms and definitions

Most activities that involve hazardous chemicals are carried out in certain locations and hence defining the limits of such an area becomes pertinent for the far reaching implications that it can have, especially with regard to the applicability of rules and regulations formulated. Defining the locational boundaries of a facility handling hazardous chemicals becomes important even when one views it from the perspective of safety and the need for containment of emergency situations. The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 defines 'site' to mean any location where hazardous chemicals are manufactured or processed, stored, handled, used, disposed of and includes the whole of an area under the control of an occupier and includes pier, jetty or similar structure whether floating or not.⁹

The 1989 Rules, also defines 'industrial activity' to mean any operation or process carried out in any of the industrial installations referred to in Schedule 4¹⁰ which involves or is

7 As per Section 2(n) the threshold quantity means, -

- (i) in the case of a hazardous chemical specified in column 2 of Schedule 2, the quantity of that chemical specified in the corresponding entry in columns 3 and 4 ;
- (ii) in the case of a hazardous chemical specified in column 2 of part I of Schedule 3, the quantity of that chemical specified in the corresponding entry in columns 3 & 4 of that part;
- (iii) in the case of substances of a class specified in column 2 of part II of Schedule 3, the total quantity of all substances of that class specified in the corresponding entry in columns 3 and 4 of that part.

8 Rule 2(ja), Manufacture, Storage and Import of Hazardous Chemical Rules, 1989.

9 *Ibid* Rule 2(m).

10 Schedule 4 of the Rules enlists installations that are set up for different purposes such as installation for the production, processing or treatment of organic or inorganic chemicals using for this purpose, among others; Alkylation, amination by ammonolysis, carbonylation, condensation, dehydrogenation etc., hydrogenation, Hydrolysis, oxidation etc; installation for distillation, refining or other processing of petroleum or petroleum products, installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition, installations for production, processing, use or treatment of energy gases, for example, LPG, LNG, SNG, installation for the dry distillation of coal or lignite; installations for the production of metals or non-metals by a wet process or by means of electrical energy.

likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport associated with that operation or process.¹¹ As per the definition, industrial activity also includes an isolated storage; or a pipeline.¹² When hazardous chemicals are kept in storages other than the storage associated with an installation on the same site enlisted under Schedule 4 where that storage involves atleast quantities of that chemical set out in Schedule 2, such storages are defined as isolated storages.¹³ 'Pipeline' has been defined to mean a pipe (together with any apparatus and works associated) or system of pipes (together with any apparatus and work associated) for the conveyance of a hazardous chemical other than a flammable gas as set out in Column 2 of Part II of Schedule 3 at a pressure of less than 8 bars absolute. Inter-state pipelines have also been included in the definition of pipeline.¹⁴

Application of the Rules : Implementation Scheme of the Rules

The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 applies to occupiers of different sites where industrial activity is carried out. However, it is interesting to note that different rules apply for different industrial activities based upon the hazardous chemicals they deal with and the quantity of these chemicals stipulated in the Schedules appended to the Rules. Thus, the applicability of these Rules on industrial activity and consequently on the occupiers of industrial activity depends on their type of hazardous chemicals they deal with, their threshold quantity and other criteria and particulars laid down in the Schedules.

Duty of Occupier of Industrial Activity and Isolated Storage

Rule 4 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 applies to any industrial activity in which a hazardous chemical is involved or may be involved; and any isolated storage of a hazardous chemical listed in Schedule 2 in a

11 *Supra* note 8, Rule 2 (h)(i).

12 *Ibid* Rule 2 (h)(ii) and 2(h)(iii).

13 *Ibid* Rule 2 (i).

14 *Ibid* Rule 2 (k).

quantity equal to or more than the threshold quantity specified in Column 3.¹⁵ An occupier of an industrial activity which contains hazardous chemicals that satisfies the requirements laid down under the Rules is enjoined with certain responsibilities. The occupier must provide evidence to show that he has identified major accident hazards and has taken adequate steps to prevent such accidents and to limit their impact on people and the environment. The Rules also makes the occupier responsible for the safety of persons working on the site. The persons working on the site must be provided with adequate information, training and equipment including antidotes to ensure their safety on site from chemical hazards.¹⁶

Approval of concerned authority:

Some occupiers of industrial activity and isolated storage that fulfill the criteria laid down under Rule 6; that is; deal with quantities of hazardous chemicals as stipulated under Rule 6 must take prior approval from the concerned authority before industrial activity is commenced.¹⁷

RULE 6 - CRITERIA FOR INDUSTRIAL AND ISOLATED STORAGE FOR APPLICABILITY OF RULES 7-15	
KIND OF ACTIVITY	CRITERIA FOR APPLICABILITY
Industrial activity	Quantity of hazardous chemical listed in Schedule 3 Column 2 which is equal to or more than the quantity specified in the entry for that chemical in Column 3 & 4. Illustration: If the industrial activity involves the usage of Arsenic pentoxide, Arsenic

15 *Ibid* Rule 4.

16 *Ibid* Rule 4(2).

17 *Ibid* Rule 7.

	(V) acids and salts (listed under Column 2 of Schedule 3), it must use at least 500kg (listed under Column 3) or more of the chemical for the application of Rules 5, 7-9 and 13-15 For the applicability of Rules 10-12 quantity specified in the entry Column 4 shall apply) Illustration: If the industrial activity involves the usage of Methyl isocyanate (listed under Column 2 of Schedule 3), it must use at least 150kg (listed under Column 4) or more of the chemical for the application of Rules 10-12
Isolated storage	Quantity of a hazardous chemical listed in Schedule 2 Column 2 which is equal to or more than the quantity specified in the entry for that chemical in Column 3 & 4. Illustration: If the isolated storage involves the usage of Ammonia (listed under Column 2 of Schedule 2), it must use at least 60 tonnes (listed under Column 3) or more of the chemical for the application of Rules 5, 7-9 and 13-15 For the applicability of Rules 10-12 quantity specified in the entry Column 4 shall apply) Illustration: If the isolated storage involves the usage of Ammonia (listed under Column 2 of Schedule 2), it must use at least 600 tonnes (listed under Column 4) or more of the chemical for the application of Rules 10-12.

Before undertaking any industrial activity, the sites have to be notified before the authority concerned and the occupier has to submit a written report before the authority with all the particulars enlisted under Schedule 7 of the Rules. As per Rule 7, the particulars to be included in the notification of a site include:

- The name and address of the employer making the notification.
- The details of the site where the notifiable industrial activity will be carried on, including full postal address, area of the site covered by the notification and of any adjacent site; map of the site and its surrounding area to a scale large enough to show any features that may be significant in the assessment of the hazard or risk associated with the site; the location and quantities of all significant inventories of the hazardous chemicals; description of the process or storage involving the hazardous chemicals; the maximum number of persons likely to be present on site.
- Anticipated date of commencement of the industrial activity
- Name and maximum quantity of each dangerous substance which is likely to be handled in the site
- Organizational diagram of the proposed industrial activity and the set up for ensuring safety and health.
- Information on probable major accidents that may occur including conditions and circumstances that could bring about an accident and the measures taken to avert an accident.
- The arrangement for training of workers and equipment necessary to ensure their safety.

If the industrial activity to be notified is a pipeline, similar information as indicated above must be notified before the concerned authority besides full postal address of the place from which the pipeline activity is controlled, addresses of the places where the pipeline starts and finishes and a map showing the pipeline route drawn to a scale of not less than 1:400000. The notification must also reflect the total length of the pipeline, its diameter and normal operating pressure and the name and maximum quantity of each hazardous chemical that it is likely to carry.¹⁸

18 *Ibid* Schedule 7.

The aforesaid information must be made available to the concerned authority three months before the activity is commenced or before such shorter time as the concerned authority may agree. If the occupier wishes to subsequently undertake any activity which involves threshold quantity or more of an additional hazardous chemical then such activity would be deemed to be a different activity and shall be notified separately by the occupier.¹⁹ A similar stipulation has been imposed on the occupier under Rule 8 which requires the occupier to furnish a further report to the Authority, if any change is made to the site including an increase or decrease in the maximum threshold quantity of a hazardous chemical which is or is liable to be at the site or in the pipeline or at the time of cessation of the activity.

The concerned authority shall take a maximum period of 60 days to look into the written report submitted by the occupier. If the authority is of the opinion that contravention of the Environment (Protection) Act, 1986 or the Rules has taken place, it will serve an improvement notice on the occupier under Rule 19. On receipt of the improvement notice, the occupier has to remedy the contravention within a period of 45 days²⁰ and the notice served shall clearly specify the measures to be taken by the occupier in remedying the contraventions under the Rules and Act.²¹

Submission of Safety Reports and Safety Audit Reports by Occupier

Rules 10-12 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 that apply to occupiers of industrial activities and isolated storages handling hazardous chemicals that fulfil the threshold quantities enlisted under **Column 4 of Schedules 2 and 3** of the Rules respectively, vest certain responsibilities on them. Owing to the magnitude of hazardous chemicals that these sites handle, the Rules require the Occupiers to fulfil certain obligations over and above the need for approval and notification to the concerned authority before an industrial activity is undertaken. The Rules require the Occupiers to prepare and submit a safety report and a safety Audit report to the concerned Authority.

19 *Ibid* Rule 7(1).

20 *Ibid* Rule 19(1).

21 *Ibid* Rule 19(2).

No occupier of an industrial activity and isolated storage with hazardous chemicals listed under Schedule 2 and 3 that fulfills the threshold quantity under Column 4 of the Schedules shall undertake any industrial activity, unless a safety report on that industrial activity with the information specified in Schedule 8 has been prepared and a soft copy of the same has been sent to the concerned authority at least ninety days before commencing that activity.²² Along with a safety report, the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, has introduced the need for filing a safety audit report on the basis of an independent safety audit carried out by an expert, not associated with the industrial activities.²³ which should be forwarded by the occupier along with the comments of the auditor to the concerned Authority within 30 days after the completion of such Audit.²⁴ The safety audit report has to be updated by the occupier once a year by getting a fresh audit conducted by an independent auditor which also has to be submitted to the concerned Authority within 30 days to the concerned Authority along with the comments of the auditor.²⁵ After perusing the safety audit reports, if the concerned Authority so deems fit, he may issue an improvement notice to the occupier within 45 days of the submission of the said report.²⁶

**INFORMATION TO BE FURNISHED IN A SAFETY REPORT
SUBMITTED BY AN OCCUPIER BEFORE THE CONCERNED
AUTHORITY**

1. The name and address of the person furnishing the information.
2. Description of the industrial activity, namely-
 - (a) site,
 - (b) construction design,
 - (c) protection zones explosion protection, separation distances,
 - (d) accessibility of plant,

²² *Ibid* Rule 10(1).

²³ *Ibid* Rule 10(4).

²⁴ *Ibid* Rule 10(5).

²⁵ *Ibid* Rule 10(6).

²⁶ *Ibid* Rule 10(7).

- (e) maximum number of persons working on the site and particularly of those persons exposed to the hazard.
- 3. Description of the processes, namely -
 - (a) technical purpose of the industrial activity,
 - (b) basic principles of the technological process,
 - (c) process and safety -related data for the individual process stages,
 - (d) process description,
 - (e) Safety-related types of utilities.
- 4. Description of the hazardous chemicals, namely -
 - (a) chemicals (quantities, substance data, safety-related data, toxicological data and threshold values),
 - (b) the form in which the chemical may occur on or into which they may be transformed in the event of abnormal conditions,
 - (c) the degree of purity of the hazardous chemical.
- 5. Information on the preliminary hazard analysis, namely-
 - (a) types of accident
 - (b) system elements or events that can lead to a major accident,
 - (c) hazards,
 - (d) safety-relevant components.
- 6. Description of safety -relevant units, among others;
 - (a) special design criteria,
 - (b) controls and alarms,
 - (c) special relief systems,
 - (d) quick-acting valves,
 - (e) collecting tanks/dump tank,

- (f) sprinkler system,
- (g) fire fighting etc.
- 7. Information on the hazards assessment, namely-
 - (a) identification of hazards ,
 - (b) the cause of major accidents,
 - (c) assessment of hazards according to their occurrence frequency,
 - (d) assessment of accident consequences,
 - (e) safety systems, (f) known accident history.
- 8. Description of information or organizational systems used to carry on the industrial activity safety, namely-
 - (a) maintenance and inspection schedules,
 - (b) guidelines for the training of personnel,
 - (c) allocation and delegation of responsibility for plant safety,(d) implementation of safety procedure
- 9. Information on assessment of the consequences of major accidents, namely
 - (a) assessment of the possible release of hazardous chemicals or of energy,
 - (b) possible dispersion of released chemical,
 - (c) assessment of the effects of the releases (size of the affected area, health effects, property damage)
- 10. Information on the mitigation of major accidents, namely -
 - (a) fire brigade,
 - (b) alarm systems,
 - (c) emergency plan containing system of organisation used to fight the emergency, the alarm and the communication rules guidelines for fighting the emergency, information about hazardous chemicals, examples of possible accident sequences,

- (d) coordination with the District Emergency authority and its offsite emergency plan,
- (e) notification of the nature and scope of the hazard in the event of an accident,
- (f) antidotes in the event of a release of a hazardous chemical.

Once a safety audit report has been submitted to the concerned Authority by an occupier, no modification to the industrial activity must be made which materially affects the particulars of the report, unless the concerned Authority has been apprised of the same and a report detailing the modifications carried out on the industrial activity has been sent to the Authority 90 days prior to the making of those modifications.²⁷ The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 have taken into account the technical advancement that takes place over the years in all fields, especially in the field of science and has made an occupier responsible for keeping up with the safety requirements and hazards associated with an industrial activity by taking into account the new technical knowledge that can affect them. This must be done within three years of the submission of the first safety report.²⁸

Preparation of On-site Emergency Plan by the Occupier

The occupier of an Industrial Activity and Isolated Storage dealing with hazardous chemicals that are equal to or more than the threshold quantities enlisted under **Column 3 of Schedules 2 and 3** of the Rules respectively are required to prepare an on-site emergency plan for the sites they handle. The responsibility of the occupier does not end merely with the preparation of the on-site emergency plan that details how the major accidents shall be dealt with, but it must be updated at regular intervals. The plan must include the name of the person responsible for on-site safety and the names of persons authorized to take action in accordance with the plan in case of any emergency.²⁹ While preparing and keeping the emergency plan up to date the occupier shall take into account any modifications made in the industrial activity that needs to be taken note of. The

²⁷ *Ibid* Rule 11(1).

²⁸ *Ibid* Rule 11(2).

²⁹ *Ibid* Rule 13(1).

occupier is also responsible for ensuring that all persons working on the site who may be affected if a chemical hazard or accident takes place is apprised of the relevant provisions of the emergency plan.³⁰

DETAILS TO BE FURNISHED IN ON-SITE EMERGENCY PLAN BY THE OCCUPIER

1. Name and address of the person furnishing the information.
2. Key personnel of the organization and responsibilities assigned to them in case of an emergency
3. Outside organization if involved in assisting during onsite emergency:
 - (a) Type of accidents
 - (b) Responsibility assigned
4. Details of liaison arrangements between the organizations.
5. Information on the preliminary hazard analysis:
 - (a) Type of accidents
 - (b) System elements or events that can lead to a major accident
 - (c) Hazards
 - (d) Safety relevant components
6. Details about the site:
 - (a) Location of dangerous substances
 - (b) Seat of key personnel
 - (c) Emergency control room
7. Description of hazardous chemicals at plant site:
 - (a) Chemicals (Quantities and toxicological data)

30. *Ibid* Rule 13(2).

- (b) Transformation if any, which could occur.
- (c) Purity of hazardous chemicals.
- 8. Likely dangers to the plant.
- 9. Enumerate effects of:
 - (i) Stress and strain caused during normal operation:
 - (ii) Fire and explosion inside the plant and effect if any, of fire and explosion outside.
- 10. Details regarding:
 - (i) Warning, alarm and safety and security systems.
 - (ii) Alarm and hazard control plans in line with disaster control and hazard control planning, ensuring the necessary technical and organizational precautions;
 - (iii) Reliable measuring instruments, control units and servicing of such equipment.
 - (iv) Precautions in designing of the foundation and load bearing parts of the building.
 - (v) Continuous surveillance of operations.
 - (vi) Maintenance and repair work according to the generally recognized rules of good engineering practices.
- 11. Details of communication facilities available during emergency and those required for an off-site emergency.
- 12. Details of fire fighting and other facilities available and those required for an off-site Emergency.
- 13. Details of first aid and hospital services available and its adequacy.

In addition to the persons on site, the occupier of an industrial activity handling hazardous chemicals has been made responsible for the safety of persons outside the site. The occupier has the duty of informing persons outside the site who are likely to be in an area, which may be affected by a major accident, about the nature of the major accident

hazard, the safety measures to be adopted and the Do's and Don't which should be adopted in the event of a major accident.³¹ Besides the Occupier, the Rules require the Authorities identified under the Rules to develop off-site emergency plans to deal with emergencies that may arise if a possible major accidents takes place on the site. In preparing the off-site emergency plan the Authority must consult the occupier and such other persons as it may deem necessary. Apart from information on the industrial activity, the Authority may seek information on the nature, extent and likely effects off-site of possible major accidents from the occupier.³² In addition to the particulars and information contained in the on-site emergency plan prepared by the occupier, the off-site emergency plan prepared by the Authority must contain details on and make provisions for facilities and transport routes, contact for further advice e.g. meteorological information, transport, temporary food and accommodation, water and agricultural authorities, special equipment including fire fighting materials, damage control and repair items, details of emergency response procedure, evacuation arrangements, and arrangements for dealing with the press and other media interests.³³ A mock drill of the on-site emergency plan must be conducted every 6 months and a rehearsal of the off-site emergency plan must be conducted once a year by the Occupier and the concerned Authority respectively.³⁴

Preparation of Safety Data Sheet

Taking cognizance of the harm that a hazardous chemical if not handled carefully can result in, the Rules require the occupiers of industrial activities to keep information about the chemicals ready in the form of a safety data sheet. All occupiers of industrial activities that deal with hazardous chemicals that satisfy any of the criteria laid down in part I of Schedule 1 or listed in Column 2 of Part II of Schedule 1, that is industrial activities dealing with toxic chemicals, flammable chemicals, explosives and hazardous chemicals are required to prepare a safety data sheet. Information on the chemicals must be recorded accurately and must reflect the scientific evidence used in making the hazard

31 *Ibid* Rule 15.

32 *Ibid* Rule 14.

33 *Ibid* Schedule 12.

34 *Ibid* Rules 13 & 14.

determination.³⁵ The safety data sheet should reflect the chemical identity of the hazardous chemical such as name, chemical classification, hazardous ingredients etc; the physical and chemical properties such as physical state, appearance, melting point, boiling point etc; fire and explosion hazard data such as flammability, auto ignition temperature etc; reactivity data such as chemical stability, incompatibility with other chemical etc.; health hazard data which reflects the routes of entry into the human body, effects of exposure, permissible limits of exposure, emergency treatment etc. The safety data must also contain information about the contact details of the manufacturer or supplier. The safety data sheet must be made available on request for reference.³⁶

Apart from the safety data sheet that is to be made available on request, the occupier must ensure that every container of a hazardous chemical is clearly labelled or marked to identify -

- (a) the contents of the container ;
- (b) the name and address of the manufacturer or importer of the hazardous chemical;
- (c) the physical, chemical and toxicological data.³⁷

Import of Hazardous Chemicals

The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 was one of the first rules on chemical management that prescribed certain requirements that an importer of toxic chemicals, flammable chemicals, explosives and hazardous chemicals had to comply. These Rules primarily aim to ensure that no mishap occurs within the country that are triggered by the imported hazardous chemicals and no harm is caused to the environment because of such imports. In this regard the Rules have laid down certain duties and obligations that have to be fulfilled by the importer and the concerned Authority of the state of import.

35 *Ibid* Rule 17.

36 *Ibid* Schedule 9.

37 *Ibid* Rule 17(4).

Duties of Importer

The primary duty enunciated under the Rules for any importer of hazardous chemicals in India is to provide adequate information about the chemicals to the designated authorities identified under the Rules before the same is imported into India. Any person importing hazardous chemicals into the country has to provide the concerned Authority the following information:

- 1) the name and address of the person receiving the consignment in India;
- 2) the port of entry in India;
- 3) mode of transport from the exporting country to India;
- 4) the quantity of chemical (s) being imported; and
- 5) complete product safety information.

The aforementioned list of information must be provided to the Authority before 30 days or as reasonably possible but not later than the date of import.³⁸ Records of hazardous chemicals being imported have to be maintained by the importer in the manner prescribed under Schedule 10 and shall be open for inspection by the concerned authority at the State or the Ministry of Environment and Forests or any officer appointed by them in this behalf.³⁹

FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS CHEMICALS IMPORTED

1. Name and address of the Importer:
2. Date and reference number of issuance of permission to import hazardous Chemicals:

38 *Ibid* Rule 18(2).

39 *Ibid* Rule 18(5).

3. Description of hazardous chemicals:
 - (a) Physical form:
 - (b) Chemical form:
 - (c) Total volume and weight (in kilogram's/Tones)
4. Description of purpose of Import:
5. Description of storage of hazardous chemicals:
 - (a) Date:
 - (b) Method of storage

Duties of Authorities

The Authorities have been entrusted with the responsibility to ensure that the chemicals imported do not cause major accidents and if the Authority of the concerned state where the imported hazardous chemical will be kept is satisfied that the chemical may cause major accidents, it may direct the importer to take safety measures to avert any such major accident.⁴⁰ The concerned Authority at the State must also simultaneously intimate the Port authorities at the port of entry to safely handle, and store hazardous chemicals at the time when the consignment is off-loaded.⁴¹ The concerned Authority of the State has been provided wide powers under the Rules including the right to stop the import of chemicals if it is of the opinion that the chemical should not be imported into the country based on safety and environmental considerations.⁴²

Monitoring Mechanism under the Rules

Different authorities have been identified under the Rules to monitor the implementation of the Rules, notification of hazardous chemicals, issuance of orders and directions with respect to chemical management, handling and import of hazardous chemicals, preparation of off-site emergency plans and the enforcement of directions and procedures

40 *Ibid* Rule 18(3).

41 *Ibid* Rule 18(4).

42 *Ibid* Rule 18(3a).

for different industrial establishments and storages. Some of the duties entrusted on the authorities by the Rules include:

- Analysis and Reporting on Major Accidents: Where a major accident occurs in any site or pipeline, the occupier of the concerned authority has to report about the accident to the Concerned Authority and the Authority must report the same within 90 days to the Ministry of Environment, Forest and Climate Change.⁴³
- Preparation and keeping up to date off-site emergency plan.⁴⁴
- Serving of improvement notice to occupier of any site to remedy any contravention made to the Rules.⁴⁵

The following table enlists the different Authorities identified under the Rules and their respective responsibilities. A perusal of the list makes it evident that the handling, storage, import of chemicals and the prevention and containment of any accident that results from chemicals requires a multi-pronged and multi-sectoral approach.

Sl.NO	AUTHORITIES	DUTIES AND CORRESPONDING RULE
1.	Ministry of Environment, Forests and Climate Change under Environment (Protection) Act, 1986.	Notification of hazardous chemicals under the Rules

⁴³ *Ibid* Rule 5.

⁴⁴ *Ibid* Rule 14.

⁴⁵ *Ibid* Rule 19.

2.	Chief Controller of Imports & Exports under Import & Exports (Control) Act, 1947	Import of hazardous chemicals
3.	Central Pollution Control Board or State Pollution Control Board or any assigned Committee under Environment (Protection) Act, 1986 as the case may be	<p>(1) Enforcement of directions and procedures in respect of isolated storage of hazardous chemicals, regarding-</p> <ul style="list-style-type: none"> (i) Notification of major accidents (ii) Notification of sites (iii) Safety reports in respect of isolated storages (iv) Preparation of on-site emergency plans <p>(2) Import of hazardous Chemicals and enforcement of directions and procedures on import of hazardous chemicals.</p>
4.	Chief Inspector of Factories appointed under the Factories Act, 1948	<p>Enforcement of directions and procedures in respect of industrial installations and isolated storages covered under the Factories Act, 1948, dealing with hazardous chemicals and pipelines including inter-state pipelines regarding-</p> <ul style="list-style-type: none"> (i) Notification of major accidents (ii) Notification of sites (iii) Safety reports. (iv) Preparation of on-site emergency plans. Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority

5.	Chief Inspector of Dock Safety appointed under the Dock Workers (Safety, Health and Welfare) Act, 1986	Same as above vis-a-vis industrial installations and isolated storages dealing with hazardous chemicals and pipelines inside a port covered under the Dock Workers (Safety, Health and Welfare) Act, 1986.
6.	Chief Inspector of Mines appointed under the Mines Act, 1952	Same as above vis-a-vis mines
7.	Atomic Energy Regulatory Board appointed under the Atomic Energy Act, 1972	Enforcement of directions and procedures regarding: (i) Notification of major accidents (ii) Approval and Notification of Sites (iii) Safety report and safety audit (iv) Acceptance of On-site Emergency plans (v) Assisting the District Collector in the preparation of Off-Site emergency plans
8.	Chief Controller of Explosives appointed under the Indian Explosive Act and Rules, 1983	Enforcement of directions and procedures as per the provisions of (i) The Explosives Act, 1884 and Rules, namely; (a) The Gas Cylinders Rules, 1981; (b) The Static and Mobile Pressure Vessel (Unified) Rules, 1981; (c) The Explosive Rules, 1984 (ii) The Petroleum Act, 1934 and Rules, namely; (a) The Petroleum Rules, 1976; (b) The Calcium Carbide Rules, 1987 and in respect of industrial installation and isolated storages dealing with hazardous chemicals and

		pipelines including inter-state pipelines regarding (c) Notification of major accident (d) Approval and notification of sites (e) Safety report and safety audit reports (f) Acceptance of On-site Emergency plans (g) Assisting the District Collector in the preparation of Off-Site emergency plans
9.	District Collector or District Emergency Authority designated by the State Government	Preparation of off-site emergency plans
10.	Centre for Environment and Explosive Safety, Defence Research & Development Organisation (DRDO), Ministry of Defence (MoD)	Enforcement of directions and procedures in respect of laboratories, industrial establishment and isolated storages dealing with hazardous chemicals in the Ministry of Defence

5.2.2 OZONE DEPLETING SUBSTANCES (REGULATION AND CONTROL) RULES, 2000 AS AMENDED UPTO 2014

Ozone Depleting Substances include Chlorofluorocarbons (CFCs) Hydrochlorofluorocarbons (HCFCs) and Hydrobromofluorocarbons (HBFCs) which are used in India in various industries including air conditioning, refrigeration, foams, aerosol, fire fighting equipment, sterilants and solvents. As the name suggests Ozone Depleting Substances are chemicals that destroy the earth's protective ozone layer that acts as a

shield to filter the earth from the harmful ultraviolet radiation from the sun. The history of India's involvement in addressing the ill effects caused by the use of ozone depleting substances dates back to the years 1991 when India became a party to the Vienna Convention for the Protection of the Ozone Layer on 18th March and the year 1992 when it acceded to the Montreal Protocol on Substances that Deplete the Ozone Layer on 19th June, 1992.⁴⁶ India has also ratified all the amendments to the Montreal Protocol including London amendment in 1992, Copenhagen and Beijing amendments in 2003.

A Country Programme for India under the Montreal Protocol along with a National Strategy and Action Plan for controlling the use of Ozone Depleting Substances and phasing out the use of such substances was finalized with the assistance of United Nations Development Programme (UNDP), The Energy and Resources Institute (TERI) and representatives of various ministries, industries and scientific institutions which was approved in 1993. Considerable progress was made and 46,582 Ozone Depleting Potential (ODP) tonnes was phased out until 2010 when the accelerated Phase-out Management Plans (HPMP) were introduced under the Montreal Protocol.⁴⁷

India is classified as a Party operating under Paragraph 1, Article 5 of the Montreal Protocol and is qualified to receive technical and financial assistance from the Multilateral Fund (MLF), established as the financial mechanism of the Montreal Protocol and is committed to phase-out Ozone Depleting Substances (ODSs) including Hydrochlorofluorocarbons (HCFCs) in 2030 in accordance with the accelerated phase out schedule of the Montreal Protocol.⁴⁸ Annex C Group I of the Montreal Protocol classifies Hydrochlorofluorocarbons (HCFCs) as controlled substances. These HCFCs are subject to the adjusted control schedule for Article-5 countries. The countries that

46 The Montreal Protocol: India's Success Story, Ozone Cell, Ministry of Environment, Forest and Climate Change, 2018 at page 15.

47 HCFC Phase-out Management Plan (HPMP Stage-I) for Compliance with the 2013 and 2015 Control Targets for Consumption of Annex-C Group-I Substances, Ozone Cell, Ministry of Environment & Forests, Government of India, United Nations Development Programme (UNDP) at page 7. Available at: <https://www.undp.org/content/dam/india/docs/hpmp-productdocument.pdf> (Last accessed on November 19, 2019).

48 HCFC Phase-out Management Plan Stage-II, Ozone Cell Ministry of Environment, Forest and Climate Change, Government of India, March 2017 at page 1.

fall under Article 5 including India are expected to freeze the consumption of ODSs at baseline levels from 2013 and reduction of 10% from baseline levels from 2015 and subsequent reduction steps leading to 97.5% phase-out by 2030 and complete phase-out by 2040.⁴⁹

The calculated HCFC consumption baseline for India is 1,608.2 Ozone Depleting Potential (ODP) tonnes, being the average of HCFC consumption for 2009 and 2010.⁵⁰ While the usage of CFCs and HCFCs in the country had reached a staggering amount, before the phase out programmes had been initiated, the country was rather slow in adopting these chemicals when compared to the developed countries where large scale usage of the chemicals was prevalent since the 1930s. The first sector to use CFCs and HCFCs in India was the Refrigeration and Air Conditioning sector which can be traced back to the 1960s and the chemicals required were primarily imported. The use of CFCs and HCFCs in other industries such as foam manufacturing industry, aerosol industry etc., started gaining ground in the 1980s. India is the second largest producer and consumer of ODS after China, but owing to India's obligations under the international conventions and the national regulatory mechanism in place, India has already implemented HCFC Phase-out Management Plan (HPMP) Stage-I to meet the freeze target of 2013 and 10 % phase-out targets of HCFCs in 2015. As per the report released by the Ozone Cell, the production and consumption of CFCs, CTC and halons as of 1st January, 2010 (except use of pharmaceutical grade CFCs in manufacturing of Metered Dose Inhalers (MDIs) for Asthma and Chronic Obstructive Pulmonary Diseases (COPD) patients has been phased out. The production and consumption of Methyl Chloroform and Methyl Bromide have also been phased out.⁵¹ The country is presently implementing the HCFC Phase-out Management Plan (HPMP) Stage-II for the period 2016 to 2023 with special focus on the MSME sector in foam manufacturing and its successful implementation will phase out 769.49 ODP tons of HCFCs.⁵²

49 *Supra* note 47 at page 2.

50 *Supra* note 48 at page 2.

51 *Supra* note 46 at page 15.

52 *Supra* note 46 at page 33.

HCFC PHASE-OUT LIMITS FOR INDIA⁵³	
Montreal Protocol Maximum Allowable Consumption of Levels of Annex C Group 1 Substances	Consumption Limit (ODP - Ozone Depleting Potential tons)
Baseline (2009-2010 average)	1608.20
2013- Freeze on baseline levels	1608.20
2015- 90% of the baseline	1447.38
2020- 65% of the baseline	1045.33
2025- 32.5% of the baseline	522.67
2030- 2.5% of the baseline	40.21
2040- No consumption	0

The Government of India has entrusted the work relating to ozone layer protection and implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer to the Ministry of Environment, Forest and Climate Change (MoEF&CC). An Ozone Cell has been set up by the MoEF&CC to act the National Ozone Unit (NOU) to assist and effectively supervise the timely implementation of the Protocol and its ODS phaseout program in India. An Empowered Steering Committee (ESC) has also been constituted by the MoEF&CC which is supported by two Standing Committees, namely the Technology and Finance Standing Committee (TFSC) and the Standing Committee on Monitoring. The Executive Standing Committee, chaired by the Secretary of the MoEF&CC oversees the implementation of the Montreal Protocol provisions. It also reviews policies adopted in this sphere and monitors the implementation of projects/plans.⁵⁴

⁵³ *Supra* note 48 at page 2.

⁵⁴ *Supra* note 46 at page 15.

Besides the setting of targets for the phase out of Ozone Depleting Substances and meeting those targets, the other important contribution of the Montreal Protocol has been the adoption of a National Strategy and Action Plan that has led to the enactment of the Ozone Depleting Substances (Regulation and Control) Rules, which were notified in 2000⁵⁵ under the Environment (Protection) Act, 1986 and subsequently amended in 2001, 2003, 2004, 2005, 2006 and 2007. The latest amendments to the Rules have been made in 2014 to align them with the accelerated phase-out of HCFCs. Spread over 15 Rules and 12 Schedules, the Ozone Depleting Substances (Regulation and Control) Rules, regulate the production, consumption, manufacture export and import of Ozone Depleting Substances. The Rules define “ozone depleting substance” to mean the substances specified in column (2) of Schedule I, whether existing by itself or in a mixture. The definition however excludes any such substance or mixture (blend) which is in a manufactured product other than a container used for the transportation or storage of such substance.⁵⁶ Schedule I lists 96 such substances. The Schedule provides the names of the chemicals, their chemical composition along with their Ozone Depleting Potential. All the chemicals are classified under nine different groups.

Regulation of production and consumption of ozone depleting substances:

The Rules regulate the production and consumption of HCFCs as per the accelerated phase-out schedule for HCFCs. Under the Rules, production of any ozone depleting substance after the date specified in column (5) of Schedule V is prohibited unless the person concerned is registered with the authorities identified under the Act.⁵⁷ Thus, any producer of ODSs must have registered with an officer not below the rank of a Deputy Secretary in the Ministry of Environment, Forests and Climate Change within three months of the commencement of these Rules in order to continue production of ODSs.⁵⁸ Interestingly, the Rules provide meanings for the terms ‘production’ and ‘consumption’ with reference to ozone depleting substances that differ from their literal meanings to

55 Vide Notification S.O. 670 (e) dated 17 July, 2000, Ministry of Environment and Forests, Government of India.

56 Rule 2(1), Ozone Depleting Substances (Regulation and Control) Rules, 2000.

57 *Ibid* Rule 3(1).

58 *Ibid* Schedule V.

align with the objective of regulating and phasing out the use of ODSs. The term “production” in relation to any ozone depleting substance has been defined to mean the manufacture of an ozone depleting substance from any raw material or feedstock chemicals. The definition has however excluded the manufacture of a substance that is used and entirely consumed (except for trace quantity) in the manufacture of other chemicals; or quantities that are incidentally produced while manufacturing other chemical substances or quantities which are recycled or reused; or quantities destroyed by technologies as specified by the Central Government.⁵⁹ “Consumption” with respect to any ozone depleting substance has been defined to mean the amount of that substance produced in India in addition to the amount imported, less the amount exported.⁶⁰ These definitions are aligned with definitions of the terms under the Montreal Protocol.

Keeping with the need for phasing out of the production and use of CFCs, the Rules prohibits the consumption of several ODSs in the manufacture of several products by prescribing specific phase out dates. From the date of commencement of the Ozone Depleting Substances (Regulation and Control) Amendment Rules, 2014, the production and consumption of ozone depleting substances specified in Schedule I barring those under Group VI have been prohibited for all applications. However, this prohibition does not apply to substances which are for use as feedstock in the manufacture of other chemicals, with negligible emissions.⁶¹ Feedstock refers to those ozone depleting substances that are used as chemical building blocks or raw materials for other chemicals. After the latest amendment to the Rules, production and consumption of substances under Group VIII of Schedule I which includes the chemical substance Methyl Bromide has been prohibited. After 2014 and till further amendments are made to the Rules, Methyl Bromide may only be used in quarantine and pre-shipment applications.⁶²

For some of the ozone depleting substances specific time limits have been prescribed during which the production and consumption of the substances have to be regulated to

59 *Ibid* Rule 2(l).

60 *Ibid* Rule 2(d).

61 *Ibid* Rule 3(2).

62 *Ibid* Rule 3(2a).

match the percentages prescribed under the Rules. No person is permitted to produce ozone depleting substances specified that fall under Group VI of Schedule I such as HCFC-21 - Dichlorofluoromethane (CHFCl_2) or HCFC-31 - Chlorofluoromethane (CH_2FCl) and other chemicals under the Group from the date of commencement of the Ozone Depleting Substances (Regulation and Control) Amendment Rules, 2014 to the 1st January, 2040 in excess of the corresponding percentages of the baseline specified in Schedule II. Similarly only such percentages of the chemicals can be consumed in India that does not exceed the amount stipulated under Schedule II.⁶³ The Ozone Cell of the Ministry also reserves the right to issue orders regarding quotas that must be adhered to with respect to domestic market quantities of different CFCs. Producers dealing with Group VI substances are not to supply to the domestic market quantities in excess of the quota orders issued by the Ozone Cell, to cater to the needs of the domestic market of HCFC-22 for non-feedstock application. If there is a shortfall, the Central Government may allow for the import of HCFC-22 within the consumption control quantity as per the market requirements.⁶⁴ This new monitoring and reporting system by introducing the system of quotas for all feedstock applications including use of Carbontetrachloride have been introduced by the 2014 Amendment to the Rules in order to comply with phase-out targets of the production and consumption of Group VI substances (HCFCs).

For instance, use of CFCs for the manufacture of Aerosol products or pressurized dispensers (excluding metered dose inhalers for medicinal purposes), use of CFCs for the manufacture of foam products including foam part of Domestic Refrigerator and for the manufacture of Polyol for foam products was prohibited beyond 1.1.2003. Similarly, the use of methyl bromide except for pre-shipment and quarantine purposes was permitted only up till 1.1.2015.⁶⁵ Phase out date for the use of ozone depleting substances in servicing of refrigeration and air-conditioning equipment or products and servicing of fire extinguishers and fire extinguishing systems has been set at 1.1.2040. To ensure that industries and persons engaged in industrial activities that use ODSs do not go out of business, the Montreal Protocol as implemented by the Rules, makes provisions for

63 *Ibid* Rule 3(2b).

64 *Ibid* Rule 3(2c).

65 *Ibid* Schedule IV.

financial assistance to persons and enterprises for switching over to non ozone depleting substance technology or to establish or to expand new capacity with non ozone depleting technology and the phase out dates prescribed under the Rules are the dates by which the conversion must be completed.⁶⁶ Since Hydrochlorofluorocarbons (HCFCs) are chemicals that have a low Ozone Depleting Potential and are also used in the manufacture of substances as interim substitutes to replace CFCs, their use have been allowed upto 1.1.2030 in accordance with the Montreal Protocol accelerated phase-out schedule.⁶⁷

Export and Import of Ozone Depleting Substances

The Rules have enlisted countries that are party to the Montreal Protocol of 1987 under Schedule VI. Acknowledging the importance of regulating the use and consumption of ozone depleting substances on an international scale to thwart their ill effects on the environment, the Rules prohibit the import or export of any ozone depleting substance from any country not specified in Schedule VI after the commencement of these rules.⁶⁸ The Rules have adhered to the Harmonized classification of commodity codes, consistent with international system to regulate import and exports. Export or import of products made with or containing Ozone Depleting Substances and Ozone Depleting Substances including blends and mixtures of such substances from a country that is a party to the Montreal Protocol would require a licence issued by the authority identified under Schedule V - that is the Director General of Foreign Trade.⁶⁹ The licensing system was introduced in the country in 1996 based on the recommendation of the Meeting of the Parties (MOP) at Vienna in 1995. All imports require licences issued by the Directorate General of Foreign Trade (DGFT), Ministry of Commerce and Industry, Government of India, based upon the recommendations of the Ozone Cell, MoEF&CC. However, the import and export of ozone depleting substances is subject to certain restrictions, some of which have been introduced by the Amendment Rules of 2014.

66 *Ibid* Schedule IV.

67 *Supra* note 46 at page 34.

68 Rule 4, Ozone Depleting Substances (Regulation and Control) Rules, 2000.

69 *Ibid* Rule 5(1).

- The 2014 Rules have placed a bar on the issuance of import and export licence for ozone depleting substances specified under Group I, Group II, Group III, Group IV and blends containing ozone depleting substances including Group VI substances enlisted under Schedule I from the date of commencement of the Amendment Rules, 2014. This ban however does not apply to ozone depleting substances that have been recovered, recycled and reclaimed or used for destruction or for feedstock applications or have been certified by an essential use panel as essential use nominations, if any.⁷⁰
- Restrictions have also been placed for the export of HCFC22 in Group VI for which export licences shall be issued from the commencement of the Ozone Depleting Substances (Regulation and Control) Amendment Rules, 2014 until the 1st January, 2040, to export only such quantity which is the difference between the production and domestic supply volumes.⁷¹
- Aircraft, mobile or automobile, boat, train and truck air conditioning units (whether incorporated in vehicle or not), refrigerators, freezers, dehumidifiers, water coolers, ice machines, air conditioning and heat pump units, compressors, aerosol products, expect medical aerosols, portable fire extinguishers/ system cylinder enlisted under Schedule VII of the Rules that contain ozone depleting substances can be imported provided an import licence is obtained from the Director General of Foreign Trade within six months from the date of notification of the latest amended rules.⁷²
- All exporters of products mentioned aforementioned must affix a label specifying whether or not the product has been made with or contains ODSs.⁷³
- Import of air-conditioning and refrigeration equipment and other products containing Group VI substances have been prohibited from the 1st July, 2015.⁷⁴

70 *Ibid* Rule 5(2).

71 *Ibid* Rule 5(2).

72 *Ibid* Rule 10(1).

73 *Ibid* Rule 10(2).

74 *Ibid* Rule 10(1a).

Sale and Purchase and Use of Ozone Depleting Substances

The Rules also regulate the sale and purchase of Ozone Depleting Substances. For any person to sell any ozone depleting substance registration with the concerned authority is compulsory. As per the latest amendment in 2014, all traders/dealers/ wholesaler/sellers of ozone depleting substances, must get themselves registered with an officer not below the rank of Deputy Secretary in the Ministry of Environment and Forests. The last date of registration is also prescribed under the Rules and only for substances in Group VI time up to 31st December, 2039 has been allowed for registration.⁷⁵

Before any ozone depleting substances that are used for the manufacture of other substances enlisted under Schedule IV such as Aerosol products or pressurised dispensers, foam products including foam part of Domestic Refrigerator, Fire Extinguishers or Fire Extinguishing Systems are purchased from a person dealing with the different ODSs used for making such substances, the person purchasing ODS must give a declaration to the seller giving the details of the end use to which the ODS would be put within the period stipulated under Schedule V.⁷⁶ The declaration must clearly reflect *inter alia* the name of the ODS, the purpose for which it is being purchased (eg. Manufacture of aerosols, Foam products, Refrigerations & Air Conditioning products, metered dose inhalers for medicinal purposes etc,) and the quantity of the ODS being purchased⁷⁷

The Rules also prohibit engagement in any activity that deals with the manufacture of products with the use of ODS till the persons/ enterprises are registered with the concerned authorities identified under the Rules. Any person or enterprise engaged in the manufacture of products that use ODS whose capital investment is less than Rs. 1 crore must have registered with Officer-in-charge of the office Small Industries Services Institute in respective jurisdiction under Small Industries Development Organisation under the Ministry of Small Scale, Agro and Rural Industries within one year of the commencement of the Rules and any enterprise whose capital investment was more than Rs.1 crore,

⁷⁵ *Ibid* Rule 6 and Schedule V.

⁷⁶ *Ibid* Rule 7 and schedule V.

⁷⁷ *Ibid* Schedule XII.

must have registered with an officer not below the rank of a Deputy Secretary in the Ministry of Environment and Forests. All products produced with the use of ODS must be labeled to indicate the ozone depleting substances they contain.⁷⁸

To be in compliance with the HCFC Phase-out Management Plans, adopted by the country, individuals who have received technical and financial assistance from the Multilateral Fund in accordance with the Montreal Protocol are expected to not engage in any activity that involves the use of ODSs after the phase out periods or after the submission of completion report to change from ozone depleting substance technology to non ozone depleting substance technology.⁷⁹ Besides the above restrictions, the Rules also prohibits any new investment in any manufacturing facility for production of any ozone depleting substance after the phase out dates.⁸⁰

Monitoring and Reporting

The Ozone Depleting Substances (Regulation and Control) Rules, 2000 prescribe extensive monitoring and reporting mechanisms for persons producing, importing, exporting or selling ODS or stocking or purchasing ODSs for manufacture of other products, or someone who has received technical or financial assistance from any international organization. All such persons are expected to maintain records and file reports as stipulated under Schedule X with the designated authority under the Ministry of Environment, Forest and Climate Change.⁸¹

In *Indian Council for Enviro-Legal Action (ICELA) v. MoEF & Ors.*⁸² a case was brought before the Principal Bench of the National Green Tribunal directing its attention to the ill effects of HFC-23 which was being produced as a by-product by companies manufacturing HCFC-22 and that it had serious climatic impacts, particularly, air pollution. Five companies producing HCFC-22 in their refrigerant production units were impleaded

78 *Ibid* Rule 8 and Schedule V.

79 *Ibid* Rule 8 and Schedule V.

80 *Ibid* Rule 9.

81 *Ibid* Rule 14.

82 Original Application No. 170 of 2014 decided on 10 December, 2015.

as respondents in this case. The petitioner, a registered voluntary organisation working in protection of environment, rivers and lakes had prayed before the National Green Tribunal to direct companies producing HCFC22 to immediately stop venting of HFC-23 and incinerate/destroy the gas under the supervision of the Ministry of Environment, Forest and Climate Change, the Central Pollution Control Board and independent experts/body as deemed fit and proper by the NGT and to direct the Ministry and the Central Pollution Control Board to be directed to inspect the companies manufacturing HCFC-22 and thereby producing HFC-23 by product and file a status report of production, storing/ venting.

Concerned with the ill-effects of the emission of HFC-23 which being a greenhouse gas has a global warming potential 14,800 times more than carbon dioxide, with a great ozone depletion potential, the petitioner had filed this case. The National Green Tribunal in its decision acknowledged the fact that this matter was being internationally governed by the UNFCCC with reference to the Montreal and Kyoto Protocol and the Ministry of Environment, Forest and Climate Change was executing the obligations of the country under the Protocols by implementing the phase out targets for the different ODSs. HFC 23 forms a part of the basket of greenhouse gases that adversely affects the ozone layer and contributes to global warming. The NGT also took note of the fact that there is no domestic law in place to regulate the HFC-23 in the country, even though the country plans to phase out the use of HCFC-22 by 2030 under the HCFC Phase-out Management Plans. The NGT noted that although the regulation of HFC 23 was a matter of global policy and directions from the international conventions was pertinent to take action in this field till legislation was enacted in the country, the ill effects of the gas is indisputable. However, since this concern is a part of the policy of the Indian Government at the global level and poses concerns that transcend environmental considerations, the NGT was of the opinion that it was necessary to create some regulatory regime and issue some guidelines to fill the legislative gap.

The NGT directed the Ministry of Environment, Forest and Climate Change and the Central Pollution Control Board along with other concerned Ministries or expert bodies to carry out a study of all industrial units manufacturing HCFC-22 that leads to the generation of the by-product HFC-23 and create a comprehensive database. The NGT

further directed that the study should reflect the mechanism of storage, handling incinerators and emission standards of HFC-23 and must examine the impact of the gas as a pollutant and the extent to which it is affecting global warming. The bodies were also directed to issue appropriate interim and long term measures under Section 3 of the Environment Protection Act of 1986.

5.2.3 HAZARDOUS AND OTHER WASTES (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) RULES, 2016 AS AMENDED UPTO 2019

In order to regulate the hazardous wastes generated, the Hazardous Wastes (Management and handling) Rules, 1989 were notified by the Central Government. The Rules of 1989 was enacted to ensure safe handling and management of hazardous wastes in an environmentally benign manner. However, these Rules were repealed and a new set of Rules came into place. The new rules focussed on hazardous waste and their transboundary movement. The Rules titled Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008⁸³, were more specifically designed to align it with the objectives enshrined in the Basel Convention on Control of Transboundary Movements of Hazardous Wastes and its disposal⁸⁴. Thereafter, the Central Government framed the Hazardous and Other Wastes (Management and Transboundary Movement) Rules of 2016, which were recently amended in 2019⁸⁵.

APPLICATION

The Environment (Protection) Act, 1986, under Section 8⁸⁶ explicitly bars any person from handling hazardous substances except in accordance with such procedure and

83 Guidelines on Implementing Liabilities for Environmental Damages Due to Handling and Disposal of Hazardous Waste and Penalty, Central Pollution Control Board, January 2016, Ministry of Environment, Forest & Climate Change, Government of India.

84 *Supra* note 1.

85 The Amended Rules were notified on 1st March, 2019, Available at: https://kspcb.gov.in/hazardous%20and%20other%20wastes%20amendment%20rules,%202019_25-03-2019.pdf (Last accessed on 24 October 2019).

86 Section 8 - persons handling hazardous substances to comply with procedural safeguards.- no person shall handle or cause to be handled any hazardous substance except in accordance with such procedure and after complying with such safeguards as may be prescribed.

subsequent to compliance of such safeguards as may be prescribed. This provision is to be read along with Rule 13 of the Environment (Protection) Rules, 1986. The Central Government in the year 2016 notified the new Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 ('2016 Rules' for short), by replacing the older Rules framed in 2008. The term hazardous waste⁸⁷ means *any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics cause danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances and includes those as listed in Schedule-I*. Furthermore, wastes have been classified as Class-A, B and C under Schedule - II based on the concentration limits as specified under respective class. A separate classification for the imported or exported wastes has been provided Schedule - III. Overarching powers to make rules has been provided to the Central Government under Section 6 and Section 25 of the EPA. The Central Government invoking the powers vested under EPA has delegated⁸⁸ certain powers to the State Governments to issue certain directions in writing to any person, officer or any authority, which has to be mandatorily complied with. Authorities established under the different pollution control laws viz., Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB) have been assigned with the task of implementing and enforcing the provisions made under these laws.

The 2016 Rules lay down comprehensive definitions of the terms used. The term 'other wastes'⁸⁹ has also been included in the present framework. It is interesting to note that present Rules make provision for prevention, minimisation, reuse, recycling, recovery, co-processing and safe disposal in a sequential order.⁹⁰ That is to say, each of these processes have to be followed in a sequence. The Rules have also included within their

87 Rule 17 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

88 Powers under Section 5 of EPA has been delegated to the State Governments vide Notification no, S.O. 152 (e) dated 10-2-88 published in the Official Gazette no. 54 of the same date, Available at: https://indiacode.nic.in/bitstream/123456789/4316/1/ep_act_1986.pdf (Last accessed on 22 October 2019).

89 Rule 23 of 2016 Rules "other wastes" means wastes specified in Part B and Part D of Schedule III for import or export and includes all such waste generated indigenously within the country.

90 New Hazardous Waste Rules will ensure resource recovery and disposal of hazardous waste in environmentally sound manner: Javadekar, Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=138521> (Last accessed on 25 October, 2019).

ambit other types of waste like waste tyre, paper waste, metal scrap and other electronic items. The 2016 Rules contain six chapters and as many as 24 Rules.

The primary concern of the Rules is with regard to the procedure for the management of hazardous and other wastes as has been laid down under Chapter II. Rule 4 of the 2016 Rules lays down certain obligations on the Occupier for management of hazardous wastes. The occupier must follow the steps in the same order to prevent, minimize, reuse, recycle, recovery, utilisation including co-processing and finally safe disposal. The Occupier has been made responsible for safe and environmentally sound management of hazardous and other wastes in order to prevent accidents, contain contaminants and limit the consequences on humans and environment⁹¹. Provision for authorised disposal facility has been incorporated to ensure safe disposal of hazardous and other wastes. A duty has been cast upon the State Government to ensure that hazardous and other wastes are managed in environmentally sound manner by assigning a specific department vested with the authority to earmark space in the industrial areas or sheds for recycling, pre-processing of wastes in existing or upcoming industrial parks, estates and industrial clusters⁹². The duty of the State Government is not just limited to earmarking space but it also extends to the recognising and registration of workers involved in the recycling, pre-processing and other activities, assisting in formation of groups of such workers, undertaking industrial skill development activities and to conduct annual monitoring to ensure safety and health of workers involved in these activities.

Even though the Rules lay down and impose restrictions on importing and exporting of wastes, it is not completely prohibited. As per the Rules, any activity of importing may happen only for recycling, recovery, reuse and utilisation including co-processing⁹³. As per the Notification issued by the Customs Department, Government of India, certain compliances have to be followed before importing or exporting any kind of hazardous wastes. The procedure has been enumerated as per Rules 12, 13, 14 and 15, as specified under Chapter III of the 2016 Rules. Movement of these hazardous wastes to different

91 Rule 4(6) of 2016 Rules.

92 Rule 5 of 2016 Rules.

93 Rule 12(2) of 2016 Rules.

nations may happen with the Prior Informed Consent of the exporting nation and also with the permission of the MoEF&CC. Earlier, the hazardous waste had a regulated market. But, post the amendment in 2019, Government of India has banned import of any kind of solid waste including the plastic waste/scrap. Post the amendment, no importing of solid plastic waste is permitted as on 1st March, 2019. The primary objective of bringing in the amendment was to reduce the waste generation and recycling capacity in the country, gradually moving towards the phasing out of single use plastic waste by 2022⁹⁴.

The Government's move to completely prohibit the plastic waste from getting imported was due to insufficient recycling capacity in the country. Huge amounts of hazardous wastes remain without reaching the proper disposal centres for recycling. This has led to the increase in pollutants in the atmosphere. Based on the data available Class I cities account for total of 80% of the country's waste generation and considering the amount of waste generated, it is estimated that around 88 Sq.km., of precious land would be required to dump the waste by the year 2050.

Classification of Wastes

The main focus of the 2016 Rules is not restricted to the hazardous wastes, but it also focuses on other wastes which cannot be classified as *per se* hazardous. It is pertinent to note that any solid waste with properties that make it dangerous or capable of having harmful impact on health of

Hazardous waste in India

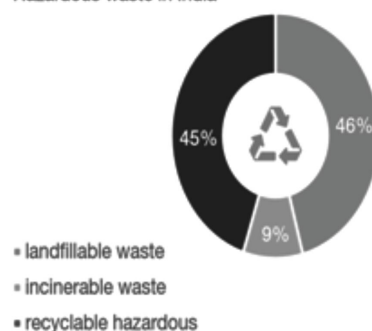


Figure – 1 Pie Chart depicting hazardous waste by method of Disposal. Source – Waste Management in India – Shifting Gears, March 2017, ASSOCHAM – PWC Report.

94 Govt Puts Complete Ban on Import of Solid Plastic Waste, Available at: <https://economictimes.indiatimes.com/news/environment/pollution/govt-puts-complete-ban-on-import-of-solid-plastic-waste/articleshow/68293186.cms?from=mdr> (Last accessed on 31 October, 2019).

humans or animals and environment in general are hazardous wastes. In order to classify what constitutes hazardous wastes, it is fundamental to identify it first. As per the study undertaken by ASSOCHAM and PWC⁹⁵, it is estimated that around 43,936 industries are operating throughout the country and generating about 7.46 mn metric tonnes of hazardous waste. The disposal methods of these hazardous wastes are by way of landfills, recycled and incinerations. Hazardous industrial wastes have been classified mainly into two broad categories⁹⁶;

- A. Hazardous industrial wastes produced in India;
- B. Hazardous industrial wastes brought into India for recycling and re-processing.

The 2016 Rules has also laid down procedure for obtaining the approvals. The process has been simplified to the extent that it is now based on the single window clearance system. The system has been set up for granting clearances to establishing the hazardous waste disposal facility. The newly set system acquires prominence as there is an impetus to process and recycle the wastes rather consuming the virgin resources of the country.

95 Waste Management in India – Shifting Gears, March 2017, ASSOCHAM – PWC, Available at: <https://www.pwc.in/assets/pdfs/publications/2017/waste-management-in-india-shifting-gears.pdf> (Last accessed on 29 October, 2019).

96 *Ibid.*

Responsibility of Authorities under the Rules

Several duties and responsibilities have been assigned to various authorities including the MoEF&CC to identify hazardous and other wastes, granting permissions for export/import/transit, promotion of environmentally sound management of hazardous and other wastes and training programs; Central Pollution Control Board to coordinate training activities, conduct training, specifying standards, annual report review or any other functions as specified; State Government/ Union Territory Government/ Administration to identify and approve sites and other related activities; State Pollution Control Boards to inventorisation of hazardous and other wastes, grant and renewal of authorisation, monitoring, examining and to take actions for violations of provisions of Rules; Directorate General of Foreign Trade to grant or refusal of license for import of hazardous and other wastes; Customs and Ports Authority for verifying documents, intimation to MoEF&CC, taking necessary actions against importer/exporter under relevant laws.⁹⁷

Powers and Functions of Agencies under EPA and HWM Rules	
Agencies	Powers and Functions
Central Government represented by Ministry of Environment, Forest and Climate Change (MoEF&CC)	<ol style="list-style-type: none">1. Laying down procedures and safeguards for handling of hazardous substances (Section 3 (2) (vii), Environment Protection Act, 1986 (EPA))2. Make rules to regulate environmental pollutants (Section 6, EPA)3. Make rules for providing the procedure in accordance with and safeguards in compliance with which hazardous substances shall be handled or cause to be handled by persons handling the same (Section 25 (2) (b), EPA)4. To deal with import and export of hazardous and other wastes (Section 11, Hazardous and Other Wastes (Management

⁹⁷ Schedule VII, corresponding Rules 13(6) and 21 of 2016 Rules.

	<p>and Transboundary Movement) Rules, 2016 (HWM Rules))</p> <p>5. Duties under Schedule VII, HWM Rules read with Rules 13 (6) and 21, HWM Rules</p> <ul style="list-style-type: none"> - Identification of hazardous and other wastes - Permission to exporters of hazardous and other wastes - Permission to importer of hazardous and other wastes - Permission for transit of hazardous and other wastes through India. - Promote environmentally sound management of hazardous and other waste. - Sponsoring of training and awareness programme on Hazardous and Other Waste Management related activities.
Directorate General of Foreign Trade constituted under the Foreign Trade (Development and Regulation) Act, 1992	<p>Duties under Schedule VII, HWM Rules read with Rules 13 (6) and 21, HWM Rules-</p> <p>Grant of licence for import of hazardous and other wastes-</p> <p>Refusal of licence for hazardous and other wastes prohibited for imports and export</p>
Central Pollution Control Board (CPCB)	<ol style="list-style-type: none"> 1. Issue guidelines or standard operating procedures for environmentally sound management of hazardous and other wastes (Section 10, HWM Rules) 2. Issue guidelines for treatment, storage and disposal facility for hazardous and other wastes (Section 16 (2), HWM Rules) 3. Issue guidelines for Packaging and Labelling (Section 17, HWM Rules)

	<p>4. Issue guidelines for transportation of hazardous and other wastes (Section 18, HWM Rules)</p> <p>5. Prepare the consolidated review report on management of hazardous and other wastes and forward it to the MoEF&CC, along with its recommendations before the 30th day of December once in every year (Section 20 (4), HWM Rules)</p> <p>6. Duties under Schedule VII, HWM Rules read with Rules 13 (6) and 21, HWM Rules:</p> <ul style="list-style-type: none"> - Co-ordination of activities of SPCBs - Conduct training courses for authorities dealing with management of hazardous and other wastes - Recommend standards and specifications for treatment and disposal of wastes and leachates, recommend procedures for characterisation of hazardous wastes. - Inspection of facilities handling hazardous waste as and when necessary. - Sector specific documentation to identify waste for inclusion in these rules. - Prepare and update guidelines to prevent or minimise the generation and handling of hazardous and other wastes. - Prepare and update guidelines/ Standard Operating Procedures (SoPs) for recycling, utilization, pre-processing, co-processing of hazardous and other wastes. - To prepare annual review report on management of hazardous waste. - Any other function assigned by MoEF&CC, from time to time <p>7. Accordingly, guidelines for the following aspects have been prepared by the CPCB⁹⁸:</p> <ul style="list-style-type: none"> - Revised Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per H&OW(M & TBM) Rules, 2016
--	--

98 Available at: <http://cpcb.nic.in/technical-guidelines/> (Last accessed on 29 October, 2019).

	<ul style="list-style-type: none"> - Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty - Guidelines for Common Hazardous Waste Incineration- Criteria for Hazardous Waste Landfills - Guidelines for Management, Handling, Utilisation and Disposal of Phosphogypsum Generated from Phosphoric Acid Plants - Protocol for performance Evaluation and Monitoring of the Common Hazardous Waste Treatment Storage and Disposal Facilities including Common Hazardous Waste Incinerators - Guidelines for Setting up of Operating Facility: Hazardous Waste Management - Guidelines for Proper Functioning and Upkeep of Disposal Sites - Guidelines for Environmental Sound Recycling of Hazardous Waste as per Schedule-V of Hazardous Waste (Management Handling and Transboundary Movement) Rules, 2008 - Guidelines for the Selection of Site for Landfilling - Guidelines for Transportation of Hazardous Wastes - Guidelines for Storage of Incinerable Hazardous Wastes by the Operators of Common Hazardous Waste Treatment, Storage and Disposal Facilities and Captive HW Incinerators - Guidelines for Conducting Environmental Impact Assessment : Site Selection for Common Hazardous Waste Management Facility - Manual for 'Sampling, Analysis and Characterization of Hazardous Wastes'
8.	A National Inventory of Hazardous Wastes Generating Industries & Hazardous Wastes Management in India has been prepared along with state-wise status. ⁹⁹

99 Available at: <http://cpcb.nic.in/inventory/> (Last accessed on 29 October 2019).

	<p>9. A project on “Remediation of hazardous waste contaminated dumpsites” in the country with CPCB as an executing agency under the National Clean Energy Fund has been initiated.¹⁰⁰ 8 contaminated areas coming under this project include¹⁰¹:</p> <ul style="list-style-type: none"> - Mercury Contaminated sites at Gunjam, Orissa - Chromium Contaminated area, Orichem, Talcher, Orissa - Chromium Contaminated area at Rania, Kanpur Dehat, Uttar Pradesh - Pesticide contaminated site near Deva Road, Lucknow, Uttar Pradesh - Chromium Contaminated Area at Ranipet, Tamil Nadu - H-Acid Contaminated Sites near Ratlam, Madhya Pradesh - Chromium and heavy Metal contaminated Area at Nibra, Howrah, WB - Pesticides Contaminated land and creeks near Eloor-Edayar, Kerala
State Government	<p>Department of Industry/Labour in the State or any other government agency authorised in this regard by the State Government (Section 5, HWM Rules):</p> <ul style="list-style-type: none"> - to ensure earmarking or allocation of industrial space or shed for recycling, pre-processing and other utilisation of hazardous or other waste in the existing and upcoming industrial park, estate and industrial clusters; - to ensure recognition and registration of workers involved in recycling, pre-processing and other utilisation activities; - to assist formation of groups of such workers to facilitate setting up such facilities; - to undertake industrial skill development activities for the workers involved in recycling, pre-processing and other utilisation;

100 Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9oq0vgx1byb2vqy3rfqmfja2dyb3vuzc5wzgy> (Last accessed on 29 October 2019).

101 Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9oq0vgx1byb2ply3rfu3rhdhvzx1nlchqymde0lnbkzg==> (Last accessed on 29 October, 2019).

	<ul style="list-style-type: none"> - to undertake annual monitoring and to ensure safety and health of workers involved in recycling, pre-processing and other utilisation. - State Government to prepare integrated plan for effective implementation of provisions on hazardous waste management and to submit annual report to the MoEF&CC
Port authority under Indian Ports Act, 1908 and Customs Authority under the Customs Act, 1962	<p>Duties under Schedule VII, HWM Rules read with Rules 13 (6) and 21, HWM Rules</p> <ul style="list-style-type: none"> - Verify the documents - Inform the MoEF&CC of any illegal traffic - Analyse wastes permitted for imports and exports, wherever required. - Train officials on the provisions of these rules and in the analysis of hazardous and other wastes - Take action against exporter or importer for violations under the Indian Ports Act, 1908 or Customs Act, 1962
State Pollution Control Board (SPCB) and Pollution Control Committees (PCC)	<ol style="list-style-type: none"> 1. To grant authorisation for managing hazardous and other wastes to occupiers of facility who are engaged in handling, generation, collection, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the hazardous and other wastes. (Section 6, HWM Rules) 2. Power to suspend or cancel an authorisation to holder of such an authorization after giving reasonable opportunity of being heard (Section 7, HWM Rules) 3. Providing authorization for utilisation of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use (Section 9, HWM Rules) 4. Monitor the setting up and operation of the common or captive treatment, storage and disposal facility (Section 16 (3), HWM Rules)

	<ol style="list-style-type: none"> 5. Provide 'No Objection Certificate' to persons transporting hazardous and other wastes within India (Section 18 (3), HWM Rules) 6. Provide necessary authorisation for transport to either sender or receivers of hazardous and other wastes within India (Section 18 (6), HWM Rules) 7. Based on annual returns received from occupiers and operators of the facilities for disposal of hazardous and other wastes, SPCB shall prepare an annual inventory of the waste generated; waste recycled, recovered, utilised including co-processed; waste re-exported and waste disposed and submit to the CPCB by the 30th day of September every year. (Section 20 (3), HWM Rules) 8. prepare inventory of hazardous waste generators, actual users, and common and captive disposal facilities and submit information to CPCB every two years (Section 20 (3), HWM Rules) 9. Duties under Schedule VII, HWM Rules read with Rules 13 (6) and 21, HWM Rules <ul style="list-style-type: none"> - Inventorisation of hazardous and other wastes-Grant and renewal of authorisation - Monitoring of compliance of various provisions and conditions of permissions including conditions of permission issued by MoEF&CC for exports and imports - Examining the applications for imports submitted by the importers and forwarding the same to MoEF&CC - Implementation of programmes to prevent or reduce or minimise the generation of hazardous and other wastes. - Action against violations of these rules. - Any other function under these Rules assigned by MoEF&CC from time to time.
--	---

Filing Returns

The 2016 Rules have specified procedure for filing returns and maintenance of records. Any person being the occupier or operator of handling hazardous or other wastes shall maintain records as has been specified under Form 3¹⁰². State Pollution Control Boards have a duty to collect and maintain such annual returns that have been filed by the occupier handling hazardous and other wastes containing the particulars specified under Form 4.¹⁰³ Furthermore, the State Pollution Control Boards, have a duty to file to the Central Pollution Control Board a report to be submitted by the 30th day of September every year containing the following;

- Annual returns received from occupiers and operators of facilities for disposal of hazardous and other wastes;
- Annual inventory of waste generated, waste recycled, recovered, utilised including co-processed, waste re-exported and waste disposed;
- Annual inventory of hazardous waste generators, actual used, and common and captive disposal facilities

In case of any accidents at the facility of the occupier handling or operating while undertaking any activities related to hazardous or other wastes, it shall be reported to the State Pollution Control Board.

Liability and Penalties

In order to address the issue of importing or exporting of wastes from or to other countries for various reasons, without having sufficient capacity to handle or manage such wastes a serious cause of concern has arisen. In this regard, the Government of India decided to ban such import or export activity of chemicals and wastes to reduce the dumping in the country. Accordingly, a set of procedures including obtaining permission from the Central Government has become mandatory. Insertion of the provision on illegal traffic¹⁰⁴ clearly lays down several conditions under which export and import of hazardous or other wastes from and into India shall be deemed to be illegal.

102 Rule 20(1) of 2016 Rules.

103 Rule 20(2) of 2016 Rules.

104 Rule 15 of 2016 Rules.

In case the importer of such hazardous wastes is not traceable, then the waste can either be sold by the Customs Authority to any user having authorisation under these rules or can be sent to authorised treatment, storage and disposal facility.¹⁰⁵

Penalty for any violations of the provisions of 2016 Rules, are supplemented with the provisions contained in the Environment (Protection) Act, 1986. Rule 23(2) of the 2016 Rules, lays down liability on occupier and operator of facility to financial penalties levied by the State Pollution Control Boards with the prior approval from the Central Pollution Control Board. Failure to comply or contravention of any provisions of the Act or Rules, will attract imprisonment for a term extending to 5 years with fine of Rupees one lakh and Rupees five thousand per day for continued contravention¹⁰⁶. The Karnataka State Pollution Control Board recently has issued a direction to all the concerned officers for filing complete information consisting of evidences, returns etc. Failure to send complete information resulting in non-enforcement of penalties and filing cases against defaulting industries/organisation, the concerned officers will be held liable personally.¹⁰⁷

5.2.3.1 HAZARDOUS WASTE MANAGEMENT IN UNITED STATES OF AMERICA

Environment Protection Agency (EPA) of the United States of America has developed a regulatory definition and process that identifies specific substances known as hazardous wastes. This is not clearly exhaustive as it encompasses an objective criterion to include such other wastes within the purview of hazardous waste. Waste generation, more specifically hazardous waste is generated from industries using chemicals, batteries and other forms of liquid and gases¹⁰⁸. The EPA has laid down certain guidelines for identification of solid and hazardous wastes. A separate legislation titled Resource Conservation and Recovery Act (RCRA)¹⁰⁹ and regulations have been implemented to

105 Rule 15(3) of 2016 Rules.

106 Section 15 - Penalty for contravention of the provisions of the act and the rules, order and direction, Environment (Protection) Act, 1986.

107 Circular No.pcb/wmc/3243/circular/2019-20, dated 04.06.2019 issued by the Karnataka State Pollution Control Board.

108 Learn the Basics of Hazardous Waste, United States Environmental Protection Agency, Available at: <https://www.epa.gov/hw/learn-basics-hazardous-waste> (Last accessed on 29 October 2019).

create a framework for proper management of hazardous and non-hazardous solid waste. As per the system in United States, the hazardous waste identification process follows the model as prescribed by RCRA. The issue of solid waste management has been persisting since the mid twentieth century. Evolution of solid waste from being mere waste to hazardous waste has only aggravated the issue of waste handling and management. Cost escalation, identification of new sites for disposal and handling waste much less the hazardous waste, shrinking capacity of disposal, long decomposition time among other issues has only added to the woes. This has led to

discovery and evolution of new mechanism for handling wastes. RCRA has developed a new framework to manage the hazardous waste safely from “*cradle to grave*”¹¹⁰. The concept of cradle to grave means, from the time waste is created, while it is transported, treated and stored, and until it is disposed.

Hazardous Waste identification process in US prescribed by RCRA

Contravention or violations of the provisions of the RCRA could result in both civil and criminal actions against the contravener or violator. A stringent enforcement mechanism has been put in place to check illegal treatment, storage, or disposal of hazardous wastes without any permit. It is apposite to note that the permission of the appropriate authority is necessary even before the hazardous wastes are exported and violation of which may result in serious consequence. The provision also specifically mentions that if any person knowingly exports hazardous waste without consent of receiving country or in violation

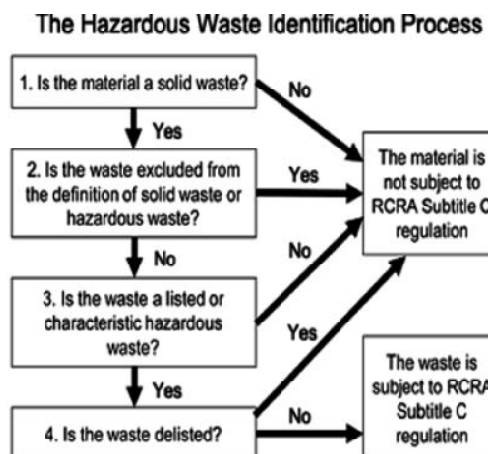


Figure – 2 Hazardous Waste Identification process. Source - Learn the basics of hazardous waste, United States Environmental Protection Agency.

109 Resource Conservation and Recovery Act (RCRA) laws and regulations, Available at: <https://www.epa.gov/rcra> (Last accessed on 29 October 2019).

110 EPA's Cradle-to-Grave Hazardous Waste Management Program, Available at: <https://www.epa.gov/hw/learn-basics-hazardous-waste#cradle> (Last accessed on 31 October 2019).

of an international agreement between the receiving country, it amounts to illegal export of hazardous wastes¹¹¹. Specific provisions for transportation of unpermitted facility, making false statement, wilful alteration, destruction or concealment of records, wilful endangerment or illegal export of hazardous wastes are considered as offences.

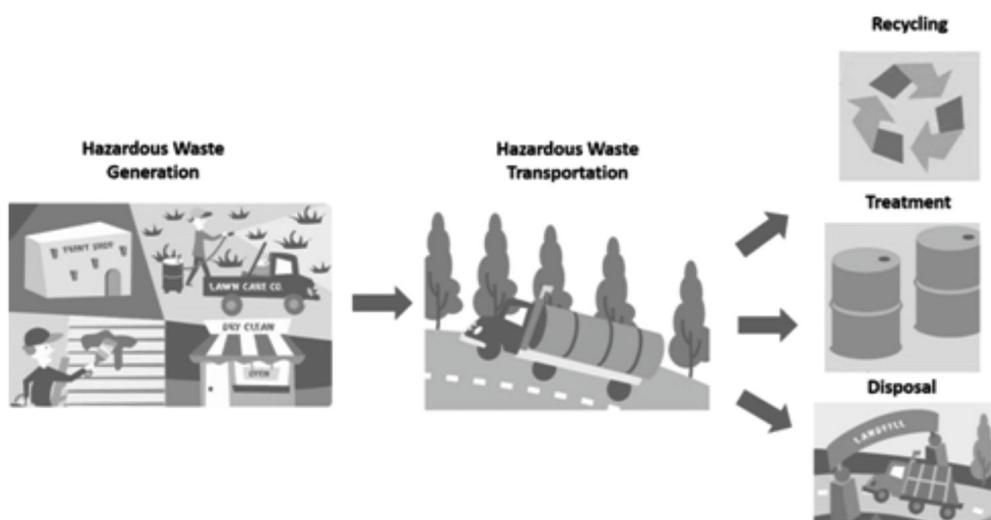


Figure -3 RCRA Framework on Cradle to grave Waste Management System. Source - Hazardous Waste Violations: Beware! EPA Fines have Increased, MCF Environmental Services.

However, as a civil remedy, any violations of the provisions of law attract hefty amounts of fine which may extend to \$70,117 per violation, per day. The laws in USA are stringent and fines imposed are massive. The rate of fines was revised in mid- 2016. Under various legislations like the Clean Air Act, Clean Water Act and other environment related legislations the fines have been nearly doubled thereby effectively keeping a check on any violations.¹¹²

111 42 USC 6928(d)(6).

112 Hazardous Waste Violations: Beware! EPA Fines have Increased, MCF Environmental Services, Available at: <https://mcfenvironmental.com/hazardous-waste-violations-beware-epa-fines-have-increased/> (Last accessed on 5 November, 2019).

5.2.4 E-WASTE (MANAGEMENT) RULES, 2016

Consumerism coupled with accessibility and development in technology has spiked the need for electrical and electronic equipment (EEE). The pace at which these gadgets are being introduced in the market is a manifestation of research and development in the sector. These devices have great utility and are user friendly. India, being one of the most populous countries in the world is witnessing escalated demands for these products. Despite there being huge demands for electrical and electronic gadgets, the supply has never been lowered. Rather the supply has always been in abundance. Mobile phones and chipsets, iron box, television sets, computers, printers, wires and connectors are few of the examples of electronic and electrical gadgets. The life span of these devices is not fixed, however due to the demand for continuous upgradation or usage, the physical devices get obsolete. Planned obsolescence has been alleged against the manufacturers of several of these devices.

A recent study has stated that the Electronic product life spans are getting shorter in addition to the consumers' desire to replace old models of devices with the new ones even though 60% of them were functioning perfectly¹¹³. It is a matter of great concern that the inefficient use of resources in nations across the world has led to depletion and degradation. The United Nations has warned that the world maybe soon hit by tsunami of e-waste¹¹⁴. Nations across the world have taken note of the issue and there are legislations and rules that are introduced to reduce, recycle and reuse the waste.

Issue of e-waste in the countries of European Union has been addressed by taking necessary policy initiatives and by adopting scientific methods for recycling and disposal. European Union defines the new stream of waste as Waste Electrical and Electronic Equipment (WEEE). Some of the developed countries even though had found out

113 Lifespan of Consumer Electronics is Getting Shorter, Study Finds. Guardian Environment Network, Susanna Ala – Kurikkafor Ends Europe, Available at: <https://www.theguardian.com/environment/2015/mar/03/lifespan-of-consumer-electronics-is-getting-shorter-study-finds> (Last accessed on 5 November, 2019).

114 'Tsunami of E-waste' to Hit the World Soon, Warns Wew UNReport, Available at: <https://www.downtoearth.org.in/news/waste/-tsunami-of-e-waste-to-hit-the-world-soon-warns-new-un-report-62958> (Last accessed on 10 November, 2019).

solutions to manage and handle the issue of E-waste, they were exporting their wastes to India, China, Vietnam, Mexico, Brazil, and other developing nations who were receiving the bulk of e-waste from North America, Japan, South Korea and Australia. The export of electronic waste is regulated under the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and its Disposal. Based on the international treaties and commitments, India had to introduce a proper legal framework to deal with the electronic waste.

The legal framework for India is robust to deal with the issue of electronic waste and several doctrines and principles have been enshrined in the Rules to ensure responsibility and fix liability on the defaulters.

5.2.4.1 LEGAL FRAMEWORK GOVERNING THE E-WASTE IN INDIA

The management of electronic waste came to the fore sometime only in the early 2000s. During this time the electronic waste was considered to be one of the hazardous wastes to be handled under the erstwhile hazardous waste management Rules, prevailing then. There was discussion and debate among the government organisations, environmentalist groups and private parties. Supreme Court of India vide its order¹¹⁵ dated 14th October, 2003 directed the Union Government and accordingly, states notified set of hazardous waste laws. This also led to the construction of numerous hazardous waste disposal facilities. However, the issue was taken note of by the Government and Parliament on 23rd December, 2005, when a Private Member's Bill on the Electronic Waste (Handling and Disposal) Bill, 2005 came up for discussion in Rajya Sabha. The Bill had several important features for consideration with regard to disposal of electronic waste along with the Municipal waste. The Bill did not pass through and ultimately it lapsed sometime in July 2010 with the expiry of the term of the member in Rajya Sabha.¹¹⁶

115 Research Foundation for Science, Technology And Natural Resource Policy vs. Union of India & Others in W.P. (civil) no.657/1995.

116 E-Waste in India, Research Unit (Larrdis) Rajya Sabha Secretariat, New Delhi, June, 2011, Available at: https://rajyasabha.nic.in/rsnew/publication_electronic/e-waste_in_india.pdf (Last accessed on 10 November, 2019).

Guidelines for Environmentally Sound Management of E-Waste, 2008

The regulatory regime for E-waste commenced with the Hazardous Waste (Management and Handling) Rules, 1989 as amended up to 2003 and subsequent changes relating to the Hazardous wastes in India. The growing concern however, did not stop the Government of India and the Central Pollution Control Board (CPCB) to prepare and publish the Guidelines for Environmentally Sound Management of E-Waste¹¹⁷ in March 2008. The primary objective of these guidelines was to provide guidance for identification of various sources of waste electrical and electronic equipments and prescribe procedures for handling of e-waste in an environmentally sound manner. The guidelines were a pilot effort by the Government which succeeded in making a law. The guidelines were applicable to all those who handle e-waste including the generators, collectors, transporters, dismantlers, recyclers and stakeholders of e-waste without any embargo on the scale of their operation. It followed some of the concepts which were already in place in the existing Hazardous Waste Rules. Guidelines have been formulated with the objective of providing guidance for identification of various sources of e-waste and methods for its handling. E-waste composition and recycling potential of items of economic value, identification for possibility of hazardous contents in e-waste, recovery, re-use and recycling options, treatment and disposal options and environmentally sound treatment technology. Guidelines also emphasised on placing the liability on the producer for the entire life cycle of product which included taking back, recycling and to ultimately dispose the product. The principle behind this is termed as Extended Producer Responsibility (EPR).

5.2.4.2 E-WASTE (MANAGEMENT AND HANDLING) RULES, 2011

The new Rules were notified in May, 2012. Some of the fundamental principles as laid down in the guidelines preceding the Rules of 2011 have been incorporated. The producers are responsible for making the consumers aware about the hazardous components present in the product. The mandatory instructions for consumers handling the gadget after the use along certain do's and don'ts have been provided. The Rules laid down responsibility not just on the producers, but also on the collection centres, consumer or bulk consumer, dismantlers and recyclers.

117 As approved vide MoEF Letter no.23-23/2007-hsmd d. March 12,2008).

a. Symbol to prevent E-waste from being dropped in garbage bins

Producers¹¹⁸ - The principle of Extended Producer Responsibility (EPR)¹¹⁹ found its mention in the Rules. Producer was to ensure that the e-wastes are channelised to registered dismantler or recycler. The duty is also extended to setting up of collection centres or taking back systems either individually or collectively. Creating awareness among the consumers about the disposal mechanism had been one of the highlighting features of the Rules.



b. Collection Centres¹²⁰ - Furthermore, the collection centres also had the responsibility of obtaining authorisation from their respective Pollution Control Boards by duly giving all the details as mandated. Collection centres had to ensure that the waste collected by them is stored in a secured manner till it is sent to the dismantlers or recyclers. Towards the environment, they had to ensure that no damage is caused while storage or transportation of e-waste. To file annual returns and maintenance of records in the format as prescribed was another responsibility vested on them.

Figure – 4 Symbol to prevent E-waste from being dropped in garbage bins.
Source - E-waste (Management and Handling) Rules, 2011.

c. Consumer or Bulk consumer¹²¹ - Waste had to be channelised to authorised collection centres or registered dismantlers or recyclers or returned to pick-up or take back services. The bulk consumers on the other hand were required to maintain records of e-waste generated by them and produce to SPCB for scrutiny.

d. Dismantler¹²² - Dismantlers had to get themselves registered with the concerned Pollution Control Board. Ensuring safety of the environment, and ensuring that health is not adversely affected during the dismantling process, and sending of dismantled wastes to recycling facilities for recovery of materials were their other responsibilities.

e. Recycler¹²³ - Primary responsibility was to obtain registration from the jurisdictional Pollution Control Board for operation and to dispose of the residue in a hazardous waste treatment storage disposal facility.

118 Rule 4 of the E-waste (Management and Handling) Rules, 2011.

119 *Ibid* Rule 4(2).

120 *Ibid* Rule 5.

121 *Ibid* Rule 6.

122 *Ibid* Rule 7.

123 *Ibid* Rule 8

The other important provisions of the 2011 Rules included the power of the Pollution Control Board to cancel authorisation of the different stakeholders for non-compliances. It also laid down the procedure for storage of wastes. The Rules contained and classified certain categories of electrical and electronic equipment including the consumer durables like televisions, washing machines, air conditions. However, these provisions were not sufficient to tackle the issue of e-waste and the loopholes had to be plugged by appropriate mechanism. Hence, the E-waste (Management) Rules, 2016 came into effect.

5.2.4.3 E-WASTE (MANAGEMENT) RULES, 2016

Notified on 23rd March, 2016, the 2016 Rules came into effect in supersession of the E-waste Rules of 2011. The Rules have been drastically changed when compared to the 2011 Rules. However, certain key features have been retained in the present Rules.

Application

The Rules of 2016 has been made applicable to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailers, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of electronic waste or electrical and electronic equipment as has been listed in the Schedule I. It includes the components, consumables, parts and spares which make the product operational. The Rules have been made applicable to the components, consumables, spares and parts of EEE. Lamps containing mercury and other chemicals like the Compact Fluorescent bulbs have been brought under the Rules.

Earlier framework provided for responsibility of producer, whereas, the present Rules has incorporated the responsibilities of manufacturer¹²⁴. The manufacturer has the responsibility to collect the e-waste generated during the manufacture of any electrical and electronic equipment and channelize it for recycling or disposal. A general duty as to

124 Producer as per the old Rules also included manufacturer. In the present Rules, manufacturer means a person or an entity or a company as defined in the Companies Act, 2013 (18 of 2013) or a factory as defined in the Factories Act, 1948 (63 of 1948) or Small and Medium Enterprises as defined in Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006), which has facilities for manufacture of electrical and electronic equipment;

the protection of environment has been made to ensure that during transportation and storage, environment is not damaged.

Under the Rules, authorisation¹²⁵ has been mandated for generation, handling, collection, reception, storage, transportation, refurbishing, dismantling, recycling, treatment and disposal of e-waste to be granted to the manufacturer, dismantler, refurbisher and recycler. Accordingly, the producer of e-waste under the principle of Extended Producer Responsibility has to establish his own collection centre, implement take back system, or the producers may also tie up with the Producer Responsibility Organisation or with the E-waste exchange. The authorisation framework for producer has been introduced as follows;

Extended Producer Responsibility¹²⁶ -Authorisation should comprise of general scheme for collection of waste Electrical and Electronic Equipment from the Electrical and Electronic Equipment placed on the market earlier, such as through dealer, collection centres, Producer Responsibility Organisation, through buy-back arrangement, exchange scheme, Deposit Refund System, etc. whether directly or through any authorised agency and channelising the items so collected to authorised recyclers;

Provision for import of electrical and electronic equipment has been allowed for those producers who have the authorisation for EPR¹²⁷. Furthermore, operation without the EPR authorisation by any producer has been considered as causing damage to the environment. A presumption has been drawn towards the defaulter for being non-compliant.

Responsibilities of collection centres as provided under the 2011 Rules have been retained. The Rules have introduced a new stakeholder - the dealers¹²⁸ and their responsibilities. Dealers have been given the responsibility of collecting on behalf of producer, and the procedure for such collection has been prescribed. The dealer or the retailer shall refund

125 *Supra* note 118, Rule 3(b).

126 *Ibid* Rule 5(1)(d).

127 *Ibid* Rule 5(3).

128 *Ibid* Rule 3 definitions - 'dealer' means any individual or firm that buys or receives electrical and electronic equipment as listed in schedule I of these rules and their components or consumables or parts or spares from producers for sale.

the amount as per the take back system or deposit refund scheme of producer of e-waste.

Refurbisher means the ones who are engaged in the activity of refurbishment of used electrical and electronic equipment. They have the responsibility of collecting the e-waste during refurbishing activity and to channelize it to the licensed dismantler or recycler. Duties of the bulk consumer, dismantler and recycler have been made more robust compared to the previous Rules.

Additionally, the State Government has been assigned the responsibility of environmentally sound management of E-waste. Sufficient area has to be earmarked in industrial space or shed for dismantling and recycling e-waste in the already existing parks and also in the upcoming ones. Moreover, the State Government also has to ensure and maintain the rolls of works and ensure that they are registered and recognised. Setting up of workers group to facilitate dismantling is one among other duties of the State Government.

Rule 13 of the Rules, specifically deals with the procedure for seeking and grant of authorisation including the EPR Authorisation of producers, authorisation of manufacturer, authorisation of refurbisher from the concerned State Pollution Control Boards. The authorisation is not a mere procedural formality but it is to ensure that the authorised agencies are brought under a uniform mechanism and the duties imposed on them are strictly enforced.

Other objective of the Rule is to ensure that there is reduction in the use of hazardous substances in the manufacture of electrical and electronic equipment and their components or the consumables or parts and spares. Chemicals like lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers are not to be found in concentration value of more than 0.1% by weight in homogeneous materials for lead and mercury and other chemicals.

Municipality has been assigned with the duty of ensuring that the e-waste of orphan products is collected and channelized to authorised dismantler¹²⁹. Orphaned products refer to non-branded or assembled EEE as specified under Schedule I or those products

129 Rule 24 of the E-waste (Management) Rules, 2016.

produced by the company, which has closed its operations¹³⁰. Liability on the manufacturer, producer, importer, transporter, refurbisher, dismantler and recycler has been fixed and any default may lead to levying of financial penalties..

What's new in the 2016 Rules?

Buy Back - The 2016 Rules has provided for buying back of the EEE which means that the producers can buy the products back for safe recycling. An incentive has also been introduced to encourage the consumers to also help recycle the electronic waste. This principle forms a part of the EPR as the reverse chain mechanism has been incorporated and mandated imposing a liability on the producers.

Consumers, Bulk Consumers, Refurbisher and Dismantlers—Roles of refurbishers and dismantlers who are mostly in the informal sector, has been aligned within the new Rules. This system will allow for formalising the informal sector and the workers will be trained to handle the electronic waste rather than resorting to the damaging practices like burning and landfilling. The segregation of precious metals or other chemicals from these products would allow for reusing the chemicals rather than opting for fresh procurement.

The consumers and bulk consumers also have been imposed with a responsibility of ensuring that the waste materials are channelized and it reaches the hands of recyclers for efficient disposal. The bulk consumers have a role to collect the items and hand it over to the authorised recyclers and the responsibility will be on the one's buying them.

Amendment of 2018— The 2016 Rules was amended in 2018. The concept of registration of Producer Responsibility Organisation (PRO) has been incorporated by the amendment. Prior to the amendment, there were no targets fixed for EPR authorisation, but for the provision of Rules to be made more effective, E-waste collection target has been introduced. CPCB has been empowered to issue guidelines for compliance under Rule 23 of the present Rules.

130 *Ibid* Rule 3(1)(aa).

Liability and Penalties

A recent study undertaken by Toxics Link has identified that major electric and electronic companies have been placed in the poor category for poor implementation of EPR¹³¹.

The present Rules are framed under the Environment (Protection) Act, 1986 and the penalty and punishment for non-compliance shall be as has been prescribed under the Act. Apart from the financial penalties, of Rs. 1 lakh, there will be imprisonment term for a period extending up to five years.

5.2.4.4 ELECTRONIC WASTE MANAGEMENT IN EUROPEAN UNION

The European Union policy and regulations on E-waste has been quite effective in terms of handling and management. The member nations have had their respective national legislations since over 2 decades. The first effort from the European Union came in the year 2003 which was in the form of a directive i.e., WEEE (Waste for Electrical and Electronic Equipment) Directive. They had identified the nature of waste being both hazardous (chemicals impacting human health) and valuable (precious metals and other items) fundamentally due to the nature of waste. EPR, has been mandated in India recently, whereas, the EU had conceived it initially and the implementation was more stringent.



Figure - 5 Symbol for Restriction of Hazardous Substances. Source - ROHS Guide.

As per the prevailing mechanism, the legislation requires heavy metals like lead, mercury and others to be substituted by safer alternatives. There is complete prohibition on dumping of EEE in landfill sites. The continuous increase in the targets for collection of E-waste has been a major highlight which is very similar to the system that was introduced in India in 2018. The concept of recycling has been reiterated even for those shops selling products like mobile phones to accept small e-waste components from customers, even if the customers do not intend on buying. Responsibility is placed on the manufacturers

131 Time to Reboot III, E-waste Rules: Assessing EPR Compliance. February, 2019 by Toxics Link.

for recycling the big items like washing machines, etc. The primary objective of this legislation is to reduce, reuse and recover as much waste as possible.

Directive in the year 2002¹³² focussing on the Restriction of Hazardous Substances as a standard was introduced for the first time. As per this Directive, several substances are banned including Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated Biphenyls and Polybrominated diphenyls. The reason for banning these chemicals was because they were hazardous to the environment and polluted landfills. They were also considered to be dangerous in terms of occupational exposure during manufacturing and disposal. The RoHS compliant standards and certification is essentially meant for manufacturing facility. Since the first directive, there have been additions to it and improvements. The second directive¹³³ was published in 2011 known as RoHS – Recast or RoHS 2¹³⁴. This directive mandated compliance of CE¹³⁵ marking directive for those products which require the CE marking of products. As on date, RoHS 3¹³⁶ is in force which has added additional four substances to the list of six.



Figure – 6 Conformité 'Européene' means European Conformity. Source - CE marking is a certification mark that indicates conformity with health, safety and environmental protection standards.

5.2.5 PLASTIC WASTE MANAGEMENT RULES, 2016

In today's era one of the major global environmental concerns has been posed by the increasing use of plastic. Plastic has been in use for over six decades and its utility is only growing day by day. Plastic and allied industries have been one of the major drivers of economic growth in the late 20th and 21st century. Plastic is a synthetic material made from polymers, which are long molecules built around chains of carbon atoms, typically with hydrogen and other compounds. It is commonly used to refer to a wide range of

132 Directive 2002/95/ec.

133 Directive 2011/65/eu.

134 ROHS Guide, Available at: <https://www.rohsguide.com/> (Last accessed on 12 November, 2019).

135 CE marking is a certification mark that indicates conformity with health, safety and environmental protection standards.

136 Directive 2015/863.

synthetic or semi-synthetic materials used for various purposes. Plastics are found in various forms and nylon, thermoplastics and tarpaulins would be some of its forms to name a few. More specifically there are seven¹³⁷ types of plastic that exist;

- a. Polyethylene Terephthalate (PET or PETE or Polyester) – used for making drinking bottles that are to be crushed and disposed after use;
- b. High-Density Polyethylene (HDPE) – Thick and strong variant commonly used to mSince has been one of the major drivers of economic growth in the late 20th and 21st century and are used to make opaque milk bottles, juice containers, shampoo bottles and medicine bottles;
- c. Polyvinyl Chloride (PVC) – Strong and durable variant for making blood bags, medical tubing, plumbing equipment like pipes, toys etc.;
- d. Low-Density Polyethylene (LDPE) – used to make grocery bags, frozen food bags, garbage bags, wrappers, and used as covers for bottles, wires and as cable covers;
- e. Polypropylene (PP) – The durability is somewhere between LDPE and HDPE, used to make thermal vests, Car parts. It is also included in disposal diapers and sanitary pad liners;
- f. Polystyrene (PS) – In other words known as Styrofoam used for packing containers, bike helmets, food containers etc;
- g. Others - Includes bio-plastics, Polycarbonate - used in making baby bottles, sippy cups, water bottles, metal food liners, dental sealants etc.

Plastic is in use at almost every stage of our day to day activities in every sector. Some countries have imbibed it in their economy in the form of plastic currency notes like Australia, Maldives amongst others. Even though it is massively popular in every part of the world for its utility, there are undesirable and adverse impacts that has already been researched and published.

137 7 Types of Plastic That You Need to know. Waste 4 Change, Availalble at:<https://waste4change.com/7-types-plastic-need-know/> (Last accessed on 13 November, 2019).

The seven types of plastics referred to in the foregoing paragraph are harmful in their own way and have been identified to have adversely impacted the health of users over a substantial period of time. That apart, plastics are infamous for being non-biodegradable. Irrespective of the quality of plastic, it is expected to last a minimum of 100 years on this planet before it disintegrates. Its presence in the marine ecosystem has proved fatal for many animals. Though there are replacements available in the form of cloth bags, corn starch bags, a stronger political will is required to replace the use of plastic with alternatives that are more environmentally benign.

The Government of India recently announced its intention to ban single use plastic bags in the country, however, due to the economic impact that such a move will have, the decision was not implemented. Nevertheless, the country is not bereft of any regulatory mechanism and specific rules have been implemented to handle and manage the plastic and the resultant waste in several countries.

5.2.5.1 RECYCLED PLASTICS MANUFACTURE AND USAGE RULES, 1999

Since the commencement of Environment (Protection) Act, 1986, the Government of India has made constant and consistent efforts to mitigate the adverse impact on the environment. Accordingly, in the year 1999, Central Government notified Recycled Plastics Manufacture and Usage Rules¹³⁸. The primary objective of this was to regulate the manufacture, sale, use and recycling of plastic bags. A basic minimum criterion of thickness was fixed at 20 microns. It further laid down that the food products shall not be packed with recycled plastic or carry bags which was a specification under the Bureau of India Standards (BIS).

Powers under the Rules were delegated to the State Pollution Control Boards and Pollution Control Committees for taking action for violation of Rules or provisions of the Act. The Rules were amended in the year 2003.

138 Manufacture and Usage of Plastic Goods, Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=74888#:~:targettext=the%20central%20government%20had%20notified,and%20recycling%20of%20plastic%20bags> (Last accessed on 12 November, 2019).

5.2.5.2 PLASTIC WASTE (MANAGEMENT AND HANDLING) RULES, 2011

Salient features of the Rules were that it imposed a ban on use of plastic materials in sachets for storing, packing or selling gutkha, tobacco and pan masala, and no food stuff was to be packed in the plastic which is recycled or compostable. It also specified that recycled carry bags must be BIS compliant as regards the colour and thickness was increased to 40 microns. The waste pickers were given explicit recognition and municipal authorities were mandated to constructively engage agencies or groups working in the waste management including the waste pickers. Urban local bodies were made responsible for setting up, operationalise and coordinate the waste management system for performing associated functions. This system was introduced in order to ensure safe collection, storage, segregation, transportation, processing and disposal of plastic waste without causing any damage to the environment during the whole process. It disallowed the open burning of plastic waste and also created awareness amongst all the stakeholders.

5.2.5.3 PLASTIC WASTE MANAGEMENT RULES, 2016

For the better implementation of the Rules and to give emphasis on plastic waste minimization, source segregation, recycling involving waste pickers, recyclers and waste processors in collection of plastic waste from households or any other source of its generation or intermediate material recovery facility and to adopt polluter's pay principle for the sustainability of the waste management, a review of the 2011 Rules was effected.

The Central Government notified the Plastic Waste Management Rules, 2016 on 18th March 2016. The Rules have brought in several changes and the most prominent being the change in minimum thickness of plastic carry bags being increased from 40 to 50 microns¹³⁹. The data provided by the Minister of Environment, Forest and Climate Change stated that 15,000 tonnes of plastic waste is generated everyday out of which 9000 tonnes is collected and processed and around 6000 tonnes of plastic waste is not being collected. Earlier the jurisdiction of the Rules were restricted only up to the municipal areas, but now it has been extended to rural areas too.

139 Government Notifies Plastic Waste Management Rules, 2016, 'Minimum Thickness of Plastic Bags Increased from 40 To 50 Microns', Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=138144> (Last accessed on 12 November, 2019).

Applicability

The definition of Plastic¹⁴⁰ as per the 2016 Rules means material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, Vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, Polybutylene terephthalate. Certain other definitions of terms like plastic sheet¹⁴¹, plastic waste¹⁴², compostable plastics¹⁴³ have also been included.

Applicability of these Rules shall be to every waste generator, local body, gram panchayat, manufacturer, importers and producer. The Rules has specifically excluded Export Oriented Units or Units in Special Economic Zone, notified by the Central Government manufacturing their products against an order for export. However Rule 2(2) clearly specifies that this exemption shall not apply to units engaged in the packaging gutkha, tobacco and pan masala and also to any surplus or rejects, left over products and related ones.

Any kind of usage of plastic including the manufacturing, importing, stocking, distribution, sale and use of carry bags, plastic sheets, packing covers, multi-layered packaging are now subjected to the conditions as specified under Rule 4. The Rule encompassed within it the guidelines as has been prescribed by the Indian Standard : IS 9833:1981 titled “List of pigments and colorants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water”.

As per the conditions laid down in the Rule, carry bags made of recycled plastic or products made of recycled plastic shall not be used for storing, carrying, dispensing or packaging ready to eat or drink food items. The impact of this would be most on the

140 Rule 3(o) of the Plastic Waste Management Rules, 2016.

141 *Ibid* Rule 3(p) “plastic sheet” means plastic sheet is the sheet made of plastic.

142 *Ibid* Rule 3 (q) “plastic waste” means any plastic discarded after use or after their intended use is over.

143 *Ibid* Rule 3(e) “compostable plastics” mean plastic that undergoes degradation by biological processes during composting to yield CO₂, water, inorganic compounds and biomass at a rate consistent with other known compostable materials, excluding conventional petro-based plastics, and does not leave visible, distinguishable or toxic residue.

small sector who are heavily reliant on the plastic much less the recycled plastic bags. The mandate of 50 microns thickness for carry bags made of virgin or recycled plastic has seen a shift from 20 microns to 40 microns to 50 microns as on date. The Rules also expressly bar the gutkha, tobacco and pan masala industries from using plastic material for storing, packing and selling. The provision of thickness is not applicable to the compostable bags made from compostable plastic and shall conform to the Indian Standard: IS 17088:2008 titled as Specifications for Compostable Plastics.

The Urban Local bodies have been assigned the role of managing the Plastic waste. Several initiatives have been provided expressly under the Rules wherein, the Local bodies may recycle and channelize the plastic waste recycler and recycling in conformity with the Indian Standards. Usage of plastic in the construction of roads as mentioned in the guidelines or energy recovery or waste to oil etc. It may be undertaken in compliance of all the pollution control laws. Municipal and Gram Panchayath have also been assigned the duty to develop and set up infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste. The activity may be done on its own or by engaging agencies or producers. A separate provision for framing bye-laws for imposing of user fee or charge has been made under the Rules.

The Rules also place responsibility on every person or group of persons, institutions, residential and commercial establishments including the Indian Railways, Airport, Port and Harbour and defense establishments generating plastic wastes that have been classified as Waste Generators. Minimising generation, segregation of plastic waste at source according to the Solid Waste Management Rules, 2000 has been mandated. A provision for littering has been retained to ensure segregated storage of waste at source or to handover the wastes to local authorities. Certain responsibility has also imposed on the producers, importers and brand owners. Any person conducting any public event like marriages,



Figure - 7 PET-Polyethylene terephthalate, HDPE-Highdensity polyethylene, V-Vinyl (PVC), LDPE-Low density polyethylene, PP-Polypropylene, PS-Polystyrene and Other means all other resins and multi-materials like ABS, PPO, PC, PBT. Source – Plastic Waste (Management and Handling) Rules, 2011.

public meetings, held in open spaces, are held responsible as waste generators. Rules¹⁴⁴ also prescribe for the marking and labelling of each plastic carry bag and multi-layered packaging in with the details as has been specified in the figure.

Producers or brand owners generating waste have been made responsible for collecting waste that was generated through their products. Previously collection of waste by producers and brand owners depended on their discretion, but presently, it has been made mandatory. The local body shall be the authority responsible for assisting them in formulation of a plan or framework. The street vendors or shopkeepers have been assigned with the responsibility of procuring license and levying charges for the plastic bags that they give as a part of the purchase.

The 2016 Rules were amended in 2018. Some new directives issued by the amended Rules as follows;

- a. To gradually phase out Multi-layered Plastics (MLP) which are non-recyclable, non-energy recoverable or have no alternate use.
- b. Registration process for producer, importer or brand owner is now based on central registration system. This has been done keeping in mind the ease of doing business. The CPCB shall be handling the central registration system.
- c. Explicit pricing of carry bags has been removed from the amendment.

Consumption of plastic in India has risen over the decades. It is estimated that around 12.8 million tonnes of plastic per annum is consumed in India¹⁴⁵. Even though the Rules are stringent on paper, their implementation needs to be evaluated.

144 *Ibid* Rule 11.

145 Plastic Infrastructure report, 2017.

Liability and Penalties

Penalties for breach of provisions of these Rules are as specified under the Environment (Protection) Act, 1986. That apart, the local bodies have also been empowered to impose fines on those who store, supply and transport or sell the items. The Government of Tamil Nadu has notified the bye-laws and empowered the Municipalities to impose and collect fines.

Government of Maharashtra in the year 2018 notified the plastic ban throughout the state with an objective to curb the usage of plastic and to fight the pollution that it causes. The notification banned manufacturing, use, sale, distribution and storage of plastic materials as bags, plates, spoons and other disposal items. Thermocol has also been included in the ban. Maharashtra State Pollution Control Board has been authorised to implement the ban, with certain responsibilities on the district and local authorities to ensure implementation. The penalty for first time offenders is Rs.5000, for second time offenders is Rs.10,000. Third time offenders attract a penalty of Rs.25,000 and imprisonment of three months.

Government of Bihar has also notified the Bihar Plastic Waste Management Byelaws, 2018 and its violations which can attract penalties ranging from Rs.100 to Rs.5000. Different state governments have taken measures to reduce plastic and its usage within their territories.

PLASTIC WASTE RELATED LAWS IN AFRICA

The African nations have taken a step ahead in banning the plastic carry bags. More than 30 countries in Africa have already implemented the ban. The plastic ban has been gaining momentum in the African continent and most of the under-developed countries in African continent has come forward to implement the ban.

TANZANIA

The Plastics Carrier Bags Regulations 2019 has been implemented in Tanzania which prevents import, export, manufacturing, sale, storage, supply and use of

plastic carry bags irrespective of its thickness in the country. As per the notification published by the Government, selling commodities wrapped in plastics unless the nature of such commodities requires plastic wrapping is prohibited.

Exceptions for usage of plastic have been made in specific sectors like medical, industrial, construction, agricultural and waste management packaging. Zanzibar, an autonomous region of Tanzania has already enforced ban on plastic bags for more than a decade. The fines for violating the provisions of the regulations are fixed up to 20 million Tanzanian Shillings. The principle of take back or buy back has been recognised and a duty has been imposed on the manufacturer or supplier of products containing plastic to setup, operate or participate in take back system in collecting their plastic water bottles for recycling purposes without any service charge. The Government has also notified to the travellers about the prohibition on bringing carrier bags into the country as of June, 2019. Authorities will confiscate the plastic bags and the Ziploc bags have been exempted to be carried for use. The move has been appreciated by several countries all over the world.

KENYA

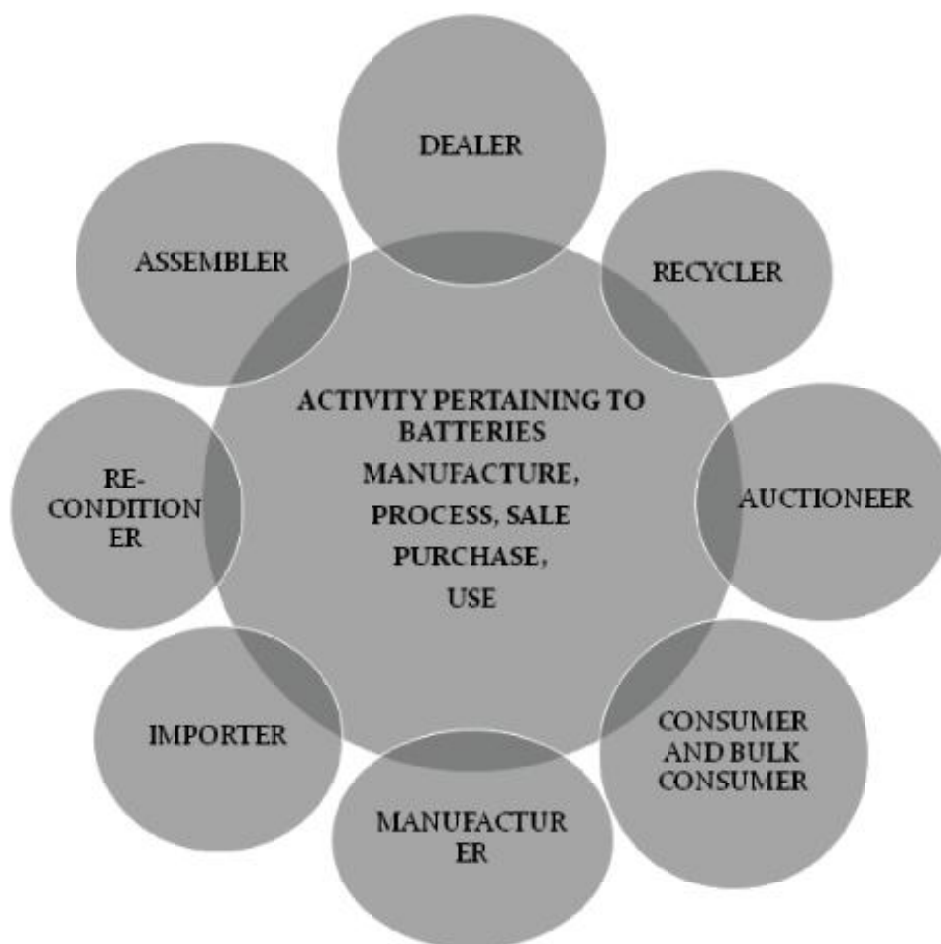
The efforts to reduce the plastic commenced in 2017. Handing out of plastic bags in Kenya was rampant and due to this the country was plagued with plastic pollution which has led to increase in number of cases of malaria as the plastic bags clogged the drains and water flowing areas resulting in breeding space for mosquitos. Because of this, the Government has made a decision to impose plastic ban on manufacturing, sale and distribution of plastic carrier bags in the country. Those found to be manufacturing, importing or selling plastic bag will be considered to have violated and could be fined up to \$40,000 or face sentence up to Four years. Any violation of the law, the fines range between \$500 and \$1500 and jail term for over up to a year. Penalties imposed by the Government have been considered to highest in the world. The efforts to reduce the plastic bags from circulation within the country are notable and laudable

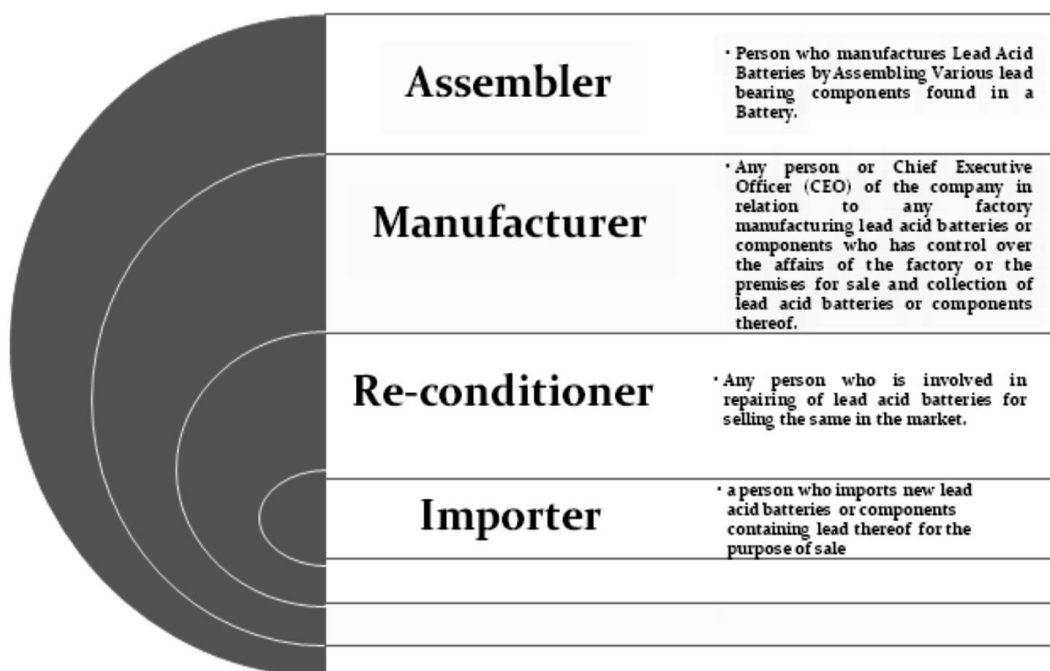
5.2.6 BATTERIES (MANAGEMENT AND HANDLING) RULES, 2001.

Pursuant to sections 6,8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government notified the Batteries (Management and Handling) Rules, 2001.

Persons covered under these rules

These Rules exhaustively cover the activities of Manufacture, Purchase, Sale, Processing and Usage in relation to Batteries.





Responsibilities of Manufacturers, Importers, Assemblers and Re-conditioners

All Manufacturers, Importers, Assemblers and Re-Conditioners of Lead Acid Batteries are required pursuant to Rule 4 of the Batteries (Management and Handling) Rules, 2001 to ensure the following:

a. Collection of Used Batteries:

- (i) They are required to collect back used batteries against new batteries sold excluding those sold to original equipment manufacturer and bulk consumer(s) and ensure that used batteries collected back are of similar type and specifications as that of the new batteries sold in the manner provided below:

Sl.No.	Year	Percentage of Collection
(i)	During first year of implementation of rules	50% of new batteries sold
(ii)	During second year of implementation of rules	75% of new batteries sold
(iii)	After second year of implementation of rules	90% of new batteries sold

- (ii) They are required to set up collection centres either individually or jointly -at various places for collection of used batteries from consumers or dealers. **(Recyclers and Assemblers are exempted from this condition).**

- (iii) They shall ensure that used batteries collected are sent only to the registered recyclers.

b. Filing of Returns and Reporting:

Half-yearly return of their sales and buy-back to the State Board in **Form- I** shall be latest by 3rd June and 30th December of each year. They are also bestowed with the duty to bring to the notice of the State Board or the Ministry of Environment and Forests any violation by the dealers.

c. Safety of Transportation:

- (i) They shall ensure that necessary arrangements are made with dealers for safe transportation from collection centres to the premises of registered recyclers.

Rule 6 provides that all imports by the Reporter shall be contingent upon

- Valid registration with the Reserve Bank of India (with Importer's Code Number);
- One-Time mandatory Registration under Rule 5 with the Ministry of Environment and Forests or an agency designated by it by submitting details in Form-I, for a period of five years.
- Submission of Undertaking in Form-III along with a copy of the latest half-yearly return in Form-IV

Where an Importer fails to collect the required number of used batteries as per the said rules or in case of non-submission of timely half yearly returns, the Registration may be cancelled thereof; and renewal of the registration shall be as per the compliance status. An appeal shall lie against any order of suspension or cancellation or refusal of registration passed by the Member-Secretary of the State Pollution Control Board or any other officer designated by the State.

- (ii) They shall also ensure that no damage to the environment occurs during transportation. **(Recyclers and Assemblers are exempted from this condition)**

d. Creation of Public Awareness:

- (i) They shall create public awareness through advertisements, publications, posters or by other means with regard to the following
- hazards of lead;
 - responsibility of consumers to return their used batteries only to the dealers or deliver at designated collection centres; and Addresses of dealers and designated collection centres.

e. Sale/Purchase of New/Used Batteries and Recycled Lead:

- (i) It shall be ensured that the new batteries shall be sold only to the registered dealers
- (ii) They shall use the international recycling sign on the Batteries(Recyclers and Assemblers are exempted from this condition);
- (iii) They shall buy recycled lead only from registered recyclers. **(Recyclers and Assemblers are exempted from this condition)**

RESPONSIBILITIES OF DEALER

Rule 7 of the Batteries (Handling and Management) Rules 2001; stipulate the following duties to every dealer of Batteries.

<p>‘Recycler’-refers to an occupier who processes used lead acid batteries or components thereof for recovering lead.</p>
--

a. Collection of Used Batteries:

- (i) The Dealer shall ensure that the used batteries are collected back as against new batteries sold in the manner provided herein below:

Sl.No.	Year	Percentage of Collection
(i)	During first year of implementation of rules	50% of new batteries sold
(ii)	During second year of implementation of rules	75% of new batteries sold
(iii)	After second year of implementation of rules	90% of new batteries sold

b. Filing of Returns and Reporting:

File half-yearly returns of the sale of new batteries and buy-back of old batteries to the manufacturer in Form V by 31st May and 30th November of each year.

c. Provision of Appropriate Discounts:

The Dealer shall provide appropriate discount for every used battery returned by the consumer.

d. Safety in Storage & Transportation of Used Batteries collected:

RESPONSIBILITIES OF RECYCLERS

Rule 8 of the Batteries (Handling and Management) Rules 2001, provides for the recycler to perform various duties.

a. Mandatory Registration of Recyclers:

Any person carrying out at the time of these Rules, or intending to carry the function of a recycler shall apply for registration to the Ministry of Environment and Forests or an agency designated by it if not applied already, by submitting information in Form VI and shall ensure strict compliance of the terms and conditions of registration; however, those already registered with the Ministry of Environment and Forests or all agency designated by it for reprocessing used batteries would be bound by the terms and conditions of such registration, who shall within 90 days of receipt of application form with complete details. The registration granted under this rule shall be in force for a period of two years from the date of issue or from the date of renewal unless suspended or cancelled

earlier. The Registration may be refused after giving reasonable opportunity to the applicant of being heard, refuse to grant registration.

An application for the renewal of registration shall be made in Form VI at least six months before its expiry.

Prescribed Authority for ensuring compliance of the provisions of these rules shall be the State Board. And, it shall file an annual compliance status report to the Central Pollution Control Board by 30th April of every year.

b. Submission of Annual Returns and Reporting:

Every Recycler shall file Annual Returns in Form VII to the State Board describing, inter alia the Total number of used battery scrap purchased from / sent for processing in such Year. The Recycler shall make available all records relating to receipt of used batteries, sources, quantities and metal yield to be submitted to the State Pollution Control Board for inspection to the State Board for inspection.

c. Marking of Recycled Lead:

Every Recycler shall mark 'Recycled' on lead recovered by reprocessing of the Used Batteries.

f. Creation of Public Awareness:

(i) Every Recycler shall also create public awareness through advertisements, publications, posters or others with regard to the following:

- Hazards of lead; and
- Obligation of consumers to return used batteries only to the registered dealers or deliver at the designated collection centres.

"Bulk consumer" means a consumer such as the Departments of Central Government like Railway; Defence, Telecom, Posts and Telegraph, the Departments of State Government, the Undertakings, Boards and other agencies or companies who purchase hundred or more than hundred batteries per annum;"

Responsibilities of Consumer or Bulk Consumer

Pursuant to Rule 10 of the Batteries (Handling and Management) Rules, 2001, every consumer shall ensure that used batteries are not disposed of in any manner other than depositing with the dealer, manufacturer, importer, assembler, registered recycler, reconditioner or at the designated collection centres.

Bulk Consumers shall have the following duties:

a. Non-Disposal of Used Batteries in otherwise than prescribed manner:

The Bulk Consumer shall ensure that used batteries are not disposed of in any manner other than by depositing with the dealer/manufacturer/registered recycler/importer/ reconditioner or at the designated collection centres,- and

b. Filing of Returns:

The Bulk Consumer shall file half-yearly return in Form VIII to the State Board, by 30th June (for the period October-March) and 31st December (for the period April-September) each year.

c. Resale of Used Batteries:

Bulk consumers to their user units may auction used batteries to registered recyclers only.

Responsibilities of Auctioneer

Rule 11 of the Batteries (Handling and Management) Rules provides that all the auctioneers shall ensure the following duties are duly performed:

a. Resale of Used Batteries:

Auctioneers shall ensure that the used batteries to registered recyclers only.

b. Filing of Returns:

Half-yearly returns of auctions to the State Boards in Form-IX, shall be submitted by the auctioneer to State Board by 30th June and 31st December of each year;

and The Auctioneers shall maintain a record of such auctions and make these records available to the State Board for inspection.

The Batteries (Handling and Management) Rules, 2001 have been suitably amended from time to time, and the Central Pollution Control Board has compiled and published the data received every year from the State Boards to ensure the review of compliance of the rules periodically to improve the collection and recycling of used lead batteries and appraise the Ministry of Environment and Forests, Government of India.

5.2.7 STRATEGIES FOR HAZARDOUS AND OTHER WASTES MANAGEMENT AT THE CENTRAL LEVEL

National Hazardous Waste Management Strategy

Objectives:

- Effective management of hazardous waste, so as to avoid environmental pollution and adverse health effects;
- To provide guidance to regulatory bodies, generators of hazardous waste, recyclers and operators of treatment, storage and disposal facilities to minimize, recycle, treat and dispose of left over hazardous waste in an environmentally sound manner;
- To facilitate implementation of the action plan in the “National Environmental Policy, 2006” in respect of management of hazardous waste;
- To fulfil obligations under the Basel Convention; and
- To promote use of cleaner technologies.

Actions:

- Inventory of hazardous waste generation by CPCB, SPCB and PCCs including end of life consumer products which have potential to generate hazardous wastes;
- MoEF&CC has developed a GIS based National Hazardous Waste Inventorization System (NHWIS), which needs to be updated on a regular basis by SPCBs/PCCs;

- Waste avoidance and waste minimization in the production process with the CPCB playing a lead role in promoting technological options;
- Reuse, recover and recycling through waste exchange banks/centers; treatment, storage, disposal and recycling facilities set up by Center or State; promotion of Extended Producer Responsibility as incorporated within E-Waste (Management and Handling) Rules, 2016; use of hazardous wastes as supplementary fuel/raw materials in cement industry, thermal power plants, iron and steel plants; and public awareness regarding safe disposal methods amongst stakeholders including general public;
- Safe and environmentally sound disposal methods for those wastes which cannot be recycled or reused through setting up of common, treatment, storage and disposal facilities (TSDF) preferably located within industrial estates; and financial support to such facilities to deal with setting up as well as post closure monitoring and liability arising due to mishaps, calamities, etc;
- Development of online tracking system by SPCB/PCC for interstate movement of hazardous waste from generation to the disposal/recovery/recycle stage.
- Stepping up of surveillance to take care of illegal dump sites and remediation through MoEF&CC's National Programme for Rehabilitation of Polluted Sites which will undertake inventorization of polluted sites, establishing best practice solutions and engaging multiple stakeholders in the implementation, including cost recovery mechanisms with focus on 'Polluter Pays Principle'; building technical capacities of select SPCBs; and creation of a dedicated fund by MoEF&CC/SPCB for remediation in cases where polluters are not traceable;
- Strengthening of infrastructure of regulatory bodies such as SPCB/PCCs in terms of manpower, equipment and other such facilities as well as providing adequate funding, training and awareness programs;
- In order to control illegal imports of hazardous wastes, harmonization of EXIM regulations with HWM Rules; training of Custom department personnel in inspection and sampling; and Up-gradation of Custom Department Laboratories;

- Disposal of date-expired drugs and pesticides using TSDFs and following India's mandate under the Stockholm Convention on Persistent Organic Pollutants with regard to destruction of banned chemicals; and
- Handling and management of hazardous waste during ship dismantling by ensuring zero generation of persistent organic pollutants; complete containment of all gaseous, liquid and solid residues; addressing health and safety of workers at ship breaking yard; adopting adequate safety systems during ship dismantling; and enforcement of recommendations by Supreme Court in ship dismantling by SPCBs/State Maritime Boards.

5.2.8 MEASURES ADOPTED BY INDIAN STATES IN HAZARDOUS WASTE MANAGEMENT

Andhra Pradesh & Telangana	<ul style="list-style-type: none"> • As of 2016-17, the quantity of hazardous waste generated in Andhra Pradesh and Telangana was 282266.4 MTA and 277078.5 MTA respectively.¹⁴⁶ • Telangana has 2642 number of hazardous waste generating units in Telangana as of 2017-18.¹⁴⁷ • With respect to Andhra Pradesh, the APPCB has inventorised 1739 units to be hazardous waste generating units which is covered within the ambit of Hazardous Waste Management Rules, 2003.¹⁴⁸ • Following steps have been taken by the Andhra Pradesh Pollution Control Board (APPCB) towards management of hazardous and other wastes¹⁴⁹: • APPCB is issuing Consent for Operation (CFO) and Hazardous Waste Authorization (HWA) together. The occupier of industry/activity/project uploads the application along with prescribed fee and required documents online through the "Single Desk Portal" – www.apindustries.gov.in.
---------------------------------------	--

146 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

147 Available at: <http://tspcb.cgg.gov.in/cbipmp/hw%20annual%20inventory%202017-18.pdf> (Last accessed on 11 November, 2019).

148 Available at: <https://pcb.ap.gov.in/achievements.html> (Last accessed on 11 November, 2019).

149 Available at: <https://pcb.ap.gov.in/hazardous-waste-management.html> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">• In case of HWA renewal, the applications made in Form-I along with the following documents are to be verified –• CFE compliance for fresh HWA application.• Compliance of HWA conditions in case of renewal• Annual returns as applicable.• TSDF membership.• These documents are verified and examined at field level for specific compliance status on case to case basis by the Regional Office / Board Officials.• Every person desirous of recycling or reprocessing the hazardous waste specified in Schedule- IV of HWM Rules has to obtain registration as recycler employing Environmentally Sound Technologies (EST). The RO verifies the application and submits report to Head Office for issue / reject the registration.• Every trader desirous of import of Metal scrap, paper waste and other wastes as listed in Schedule III (Part D) may make an application in Form - 16 to the SPCB.• In order to ensure scientific disposal of Hazardous Wastes in the State, one TSDF has been established in the name of M/s. Coastal Waste Management Project with incinerator and land fill at J.N. Pharmacity, Parawada, Visakhapatnam.• Common TSDF located in Andhra Pradesh is having surplus capacities to handle the present quantities of land disposable waste. The TSDF situated in Dindigal, Rangareddy district has been commissioned in 2006 to incinerate hazardous waste. Further this TSDF has been functioning as a common hazardous waste incinerator for disposal of hazardous hazardous waste generated in Northern Coastal Districts of Andhra Pradesh.• By opting Cleaner Production technologies, the high calorific value of Hazardous waste generated from Bulk Drugs & Pharmaceuticals industries are effectively disposed off through cement kiln being operated at 1400 degree centigrade.• APPCB in line with the guidelines of CPCB on co-processing, is encouraging cement plants with rotary kilns to establish facilities for co-processing of hazardous wastes.• APPCB is putting the responsibility of transportation of the Hazardous wastes either with generators of the hazardous wastes or with the cement
--	---

	<p>plants to avoid transportation problems. The authorised cement plants have been directed to obtain regular permission from CPCB for co-processing as and when required.</p> <ul style="list-style-type: none"> • Visakhapatnam and Bollaram Patancheru industrial areas in Andhra Pradesh have been identified as Critically Pollution Areas by Central Pollution Control Board in 1990. A.P. Pollution Control Board constituted “Monitoring Committees” in these two areas to monitor and review the status of pollution by the industries. With constant persuasion, APPCB in consultation with the industries in the Critically Polluted Areas prepared industry specific Action Plans for implementation of various mitigation measures for further reduction of pollution load and for the effective treatment and disposal of the effluents and solid wastes by the industries. • The SPCB of Andhra Pradesh as well as Telangana maintains a Hazardous waste inventory prepared annually which consists of industrial Hazardous waste generated in the State. This inventory is compiled by monitoring the district-wise contribution to the total generation of hazardous wastes.
Assam	<ul style="list-style-type: none"> • As of 2016-17, the quantity of hazardous waste generated in Assam was 29434.64.¹⁵⁰ • The West Boragaon Treatment plant is undergoing certain changes in order to adopt the novel methods of waste treatment. A new provision for treatment of hazardous and electronic waste is also underway at the plant site. • All the major sector industries in Assam have been directed to constitute a Hazardous Waste Management Committee to be headed by the top management as head of the Committee for formulation of action plan & implementation of HWM Rules. They are to meet once in a month to review the situation. • Secondly, Board also make it mandatory to organize health checkup camp for the people residing within a radius of 5 km distance from major hazardous Waste generating units at an interval of every six months with regular submission of the report to the Board along with photographs.

150 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none"> In addition to this, Board has taken various steps for construction of common TSDF as per direction of the Supreme Court Monitoring Committee (SCMC) vide letter No. 23-8/2004-HSMD (Vol.-II), dtd. 21/8/2006. Accordingly, Board has requested the state Govt. for allotment of 60 (sixty) across of land for proposed construction of CTSDf in the Central Assam area preferably near M/s. ONGCL, Jorhat and M/s. ONGCL, Sivasagar area. The Hon'ble Minister of Revenue, and Chief Secretary, Govt. of Assam is also requested for their intervention regarding allotment of land for proposed construction of common TSDF. Once the land is available, the other formalities will be observed as fast as to pave the way for construction of common TSDF.
Bihar	<ul style="list-style-type: none"> As of 2016-17, the quantity of hazardous waste generated in Bihar was 7629 MTA.¹⁵¹ It has 144 number of hazardous waste generating units in the State.¹⁵² Bihar Environment Conservation Board has completed the inventorization of hazardous wastes generating units. Board has granted authorization to these units for collection, reception, treatment, transport, storage and disposal. etc.
Chandigarh	<ul style="list-style-type: none"> It has 237 number of hazardous waste generating units as of 2009.¹⁵³ As of 2016-17, the total quantity of hazardous waste generated was 2846.892 MTA¹⁵⁴. Chandigarh PCC has tied up with Punjab Pollution Control Board and the hazardous waste generated in U.T., Chandigarh will be disposed of to TSDF at Derabassi (Punjab). The units have been asked to sign an agreement with M/s Ramky Enviro Engineers Ltd., (Operator of the facility) and M/s Nimbuan Green field Punjab Ltd., (NGPL-Developer of the facility).

151 *Ibid.*

152 Available at: <http://bhocmms.nic.in/> (Last accessed on 11 November, 2019).

153 Available at: http://chandigarhenvi.gov.in/beta/htm/research/cpcc/final_hw_report.pdf (Last accessed on 11 November, 2019).

154 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">A list of authorised parties responsible for the collection and transportation of hazardous waste from Chandigarh has also been approved by the Chandigarh PCC.¹⁵⁵
Chhattisgarh	<ul style="list-style-type: none">As of 2016-17, the total quantity of hazardous waste generated in Chhattisgarh was 65186.14 MTA.Chhattisgarh Environment Conservation Board has completed the inventorization of hazardous wastes generating unit as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. CECB has issued total 359 nos. of authorization to hazardous waste generating units as on 20-04-2019. Board has granted authorization to these units for Generation, Collection, Storage, Transportation, Reception, Reuse, Recycling, Recovery, Co-Processing, Utilisation, Treatment, Disposal. As per third party inventorization report total waste quantity is about 3,14,903 MT (Three Lakhs fourteen thousand nine hundred three MT).TSDF proposed to be set up.
Daman, Diu, Dadra & Nagar Haveli	<ul style="list-style-type: none">It has 1937 number of hazardous waste generating units as of 2009.¹⁵⁶There are 4 individual incineration facilities.
Delhi	<ul style="list-style-type: none">As of 2016-17, the total quantity of hazardous waste generated in Delhi was 4197.36 MTA.¹⁵⁷The stand of the NCT Delhi is that 1,100 hazardous waste generating units are operating as on 23rd March, 2018¹⁵⁸

155 Available at: <http://chandigarhenvi.gov.in/beta/departments/cpcc/hwrecyclers.pdf> (Last accessed on 11 November 2019).

156 Available at: http://www.ciiwasteexchange.org/wasteinventory/inventory_hw%20in%20india.pdf (Last accessed on 11 November, 2019).

157 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

158 Available at: https://www.dpcc.delhigovt.nic.in/ngt_order_15.05.2019.pdf (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none"> • A common TSDF is proposed to be developed at Khanjhawala Village or Gummanhera Village of Delhi.¹⁵⁹ • About 2267 number of Hazardous Waste Authorizations Granted under the HWM rules. • An amount of Rs 45.02 Crore has been paid to DSIDC for 50 acres of land to be developed for TSDF.
Goa	<ul style="list-style-type: none"> • Hazardous waste generating industries –North Goa – 674 , South Goa – 766. <p>As of 2009, the quantity of hazardous waste generated in Goa was 26648 MTA.¹⁶⁰</p>
Gujarat	<ul style="list-style-type: none"> • It has 7751 number of hazardous waste generating units as of 2009.As of 2016-17, the total quantum of hazardous waste generated was 2811925.3 MTA.¹⁶¹ <p>Following activities have been undertaken by Gujarat SPCB:¹⁶²</p> <ul style="list-style-type: none"> • There are 7 operational TSDFs for the disposal of land disposable hazardous waste. There 6 common hazardous incineration facilities.¹⁶³ • GPCB has taken various initiatives for adopting the co-processing concept under ‘Utilisation of Waste’ so far till March 2019@ 207 Lakh MT hazardous waste and non-hazardous waste disposed properly by co-processing of waste at cement industries.

159 *Ibid.*

160 Available at: <https://cpcb.nic.in/displaypdf.php?id= ahdtzc9ozxdjdgvtzxe 0nv9od19pbnzlnbrvcn lfzmluywxcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

161 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

162 Available at: https://gpcb.gujarat.gov.in/uploads/ar_2018_19_english.pdf (Last accessed on 11 November, 2019).

163 Available at: <https://gpcb.gov.in/hazardous-wastes-facilities-in-gujarat.htm> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none"> • To boost up the concept of co-processing of waste in cement plants, a regulatory forum (RF) under the Chairmanship of Member Secretary, GPCB and Member Secretaries of SPCBs of Andra Pradesh, Rajasthan, Orissa, Tamil Nadu, Karnataka along with representative of MoEF&CC, CPCB, CMA and IIP have been constituted. • The Central Laboratory at Gandhinagar provides facilities for analysis of hazardous waste samples apart from its regional laboratories located across the state. • A Committee has been constituted for finalization of the Registration as recyclers with environmentally sound management facilities under the HWM Rules and a committee to finalize the permission for co-processing of Hazardous Waste and other waste in Cement kiln/Thermal Power Plants/Steel plants is also in place. • Identification of site for the disposal of hazardous wastes. • Processing and finalisation of Consolidated Consents and/ Authorisation applications under the Water Act, the Air Act and the HWM Rules. • On 21st May 2014, RO, Gujarat SPCB, Bhuj organised Environmental Clinic for storage terminals - storage of chemicals & petrochemical, edible& non edible oil units of Kutch region and cement manufacturing units of Kutch & Saurashtra region for co-processing & Hazardous Chemicals Rules including bulk liquid storage of chemicals, petro chemicals & edible and non-edible oil terminals facing issues of handled/ storage of hazardous chemicals and petrochemicals areas. • Online tracking system is developed for movement of hazardous waste.
Haryana	<ul style="list-style-type: none"> • As of 2016-17, the total quantum of hazardous waste generated was 58829.43 MTA.¹⁶⁴ List of Units authorized by the Haryana State Pollution Control Board as Reprocessor /Refiner/Recycler of Hazardous Waste covered under Schedule IV of Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 – 119 in number.

¹⁶⁴ State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">• Annual Inventory of Hazardous Waste year-wise under HWM Rules is available for 2016-2017.• List and detail of Units Registered/Authorized with Haryana SPCB for Recycling of Hazardous Waste and those units for utilization of Hazardous and Other Waste as a resource or after pre-processing either for co-processing or for any other use under HWM Rules are available.¹⁶⁵• A comprehensive procedure for authorization under HWM Rules of 2016 has been prepared and issued on 02.11.2018.¹⁶⁶
Himachal Pradesh	<ul style="list-style-type: none">• As per 2016-17, the total hazardous waste generated was 29029.38 MTA.¹⁶⁷ As per Annual Report 2018-19¹⁶⁸• Total Number of HW generating Industries – 2508 (Note 1033 of them closed during 2018-19)• Total Number of HW processing units – 1808.
Jammu & Kashmir¹⁶⁹	<ul style="list-style-type: none">• As of 2016-17, the total quantum of hazardous waste generated was 1043.21 MTA.¹⁷⁰• As per the inventory report of Hazardous wastes 2016-17 prepared by the Jammu and Kashmir Pollution Control Board, about 1043.21 metric

165 Available at: http://hspcb.gov.in/cp_menu_hwm.html (Last accessed on 11 November, 2019).

166 Available at: <http://hspcb.gov.in/procedurehazardouswaste.pdf> (Last accessed on 11 November, 2019).

167 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

168 Available at: <https://hppcb.nic.in/> (Last accessed on 11 November, 2019).

169 Available at: http://jkenvis.org/waste_hazardous_jammu_2012.html (Last accessed on 11 November, 2019).

170 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<p>tonnes of hazardous wastes is being generated by 213 hazardous waste generating units.¹⁷¹</p> <ul style="list-style-type: none">• The hazardous waste generated by the units is being stored, within the unit premises, in the absence of a TSDF. In specific cases, permission for transportation of hazardous waste to a TSDF outside the state is granted. The authorization in some cases is also granted for recycling, reuse and reprocessing of hazardous waste.• J&K State Industrial Corporation (SIDCO) has notified 80 kanals of land for setting up of an Integrated Common Hazardous Waste Treatment, Storage, Disposal and Recycling facility (ICHWTSDRF) at Phase-II, Industrial Growth centre (IGC), Samba in village Mandhera, Tehsil and District Samba. Environmental Clearance has been granted by the MoEF&CC.
Jharkhand	<ul style="list-style-type: none">• As of 2016-17, the total quantum of hazardous waste generated was 578788.6 MTA.¹⁷²• List of Authorized recyclers/ utilizers/ co-processors of hazardous waste in Jharkhand is 9.¹⁷³ There is 1 individual incineration facility. Till date no common TSDF has been developed. There is one common TSDF plant.
Karnataka	<ul style="list-style-type: none">• As of 2016-17, the total quantum of hazardous waste generated was 336791.6 MTA.¹⁷⁴

171 Available at: https://www.cpcb.nic.in/openpdf.php?id=uhvibg_ljyxrbp25gawxllze5mjvfmtuyotu4mjg3nl9tzwrpyxbob3rvmti1os5wzgy (Last accessed on 11 November, 2019).

172 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

173 Available at: <https://jspcb.nic.in/> (Last accessed on 11 November, 2019).

174 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">• The Karnataka Pollution Control Board has identified 3134 hazardous waste generating industries in Karnataka and issued authorization.¹⁷⁵• There are 2 TSDF facilities in the State.• Treatment, Storage, Disposal Facility (TSDF) is established at Dabaspeta, Nelamangala Taluk, Bengaluru Rural District by Ramky Enviro Engineers on BOOT model basis and same is in operation since 2008.• One more Treatment, Storage, Disposal Facility (TSDF) is established at Harohalli Industrial area, Kanakapura Taluk, Ramanagar District by Mother Earth Environ Tech Pvt Ltd.• The Board has issued authorization to Six common incineration facilities in the State.• The Board has accorded authorization for co-processing of incinerable hazardous waste in Cement plant. Nine cement plants have established facilities for handling the incinerable hazardous waste.
Kerala	<ul style="list-style-type: none">• As of 2016-17, the total quantum of hazardous waste generated was 38466.20 MTA.¹⁷⁶• The number of HW waste generating industries is 1215. (Annual report 2017-18)¹⁷⁷. Authorisation under HWM Rules is required by generators/handlers/disposers of hazardous wastes for collection, reception, treatment, transport, storage and/or disposal of hazardous wastes. Application for Authorisation is to be submitted to the Regional/District offices of the Board. The application is available free of cost from all offices of the Board or can be downloaded from this web site. The application is to be submitted along with the application for the Integrated Clearance.

¹⁷⁵ Available at: https://kspcb.gov.in/annual_report_eng_17-18.pdf (Last accessed on 11 November, 2019).

¹⁷⁶ State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

¹⁷⁷ Available at: <https://www.keralapcb.nic.in/> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none"> • The generators of waste oil/used oil, lead acid batteries, non-ferrous metals can dispose their waste only by sale/transfer to pre-processors who have authorisation from the Board and registration with MoEF&CC. Application form for Registration is available at all offices of the Board and the Ministry and can also be downloaded from this web site.¹⁷⁸ • List of the units in Kerala registered with MoEF/CPCB/SPCB as recyclers/reprocesses is available in the inventory mentioned above.¹⁷⁹ • There is 1 common and 1 individual incineration facilities.¹⁸⁰ • The Government of Kerala identified 50 acre of land, meeting the specifications of the CPCB, in the premises of the FACT, Ambalamedu, Ernakulam for common TSDF. The construction activities have been started at the site and are progressing in full swing. Now temporary storage building, laboratory building and fencing are being provided with priority. The work is also commenced for the first cell of the land fill facility. For collection and transportation of wastes, order for sample container has been placed and is expected to be delivered soon.¹⁸¹
Madhya Pradesh	<ul style="list-style-type: none"> • As of 2016-17, the total quantum of hazardous waste generated was 125880.7 MTA.¹⁸² • The number of hazardous waste generation industries in Madhya Pradesh in 2017-18 amounts to 2564 industries.¹⁸³

178 Available at: <https://www.keralapcb.nic.in/#> (Last accessed on 11 November, 2019).

179 Available at: https://www.keralapcb.nic.in/cmsadmin/fileuploads/inventory_of_hazardous%20wastes-ernakulam_up_29-09-2018.pdf (Last accessed on 11 November, 2019).

180 Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlnbrvcnfzmluywxfcmywb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

181 Available at: https://www.keralapcb.nic.in/cmsadmin/fileuploads/inventory_of_hazardous%20wastes-ernakulam_up_29-09-2018.pdf (last accessed on 11 November, 2019).

182 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

183 Available at: <http://www.mppcb.nic.in/proc/final%20report%20-%20hz%20inventory%202017-18annual%20reports.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">• A separate cell established for this purpose named as “Hazardous Substance Management Division” (HSMD) at Head Office level. The head office is supported with a network of Regional Offices across the State for regular vigil on the Industries. Head office issues Authorization/ renewal to Large and Medium scale industries while authorizations to small-scale industries are issued by Regional offices.• A laboratory developed for characterization of hazardous wastes at its Research Center, Bhopal. This laboratory has been recognized under EPA and is carrying out the analysis of Hazardous Wastes Samples.• Common TSDF located in Madhya Pradesh is having surplus capacities to handle the present quantities of land disposable waste. It became operational from November 2006 and has following facilities:<ul style="list-style-type: none">o Temporary storage of wastes.o Solidification/stabilization.o Incineration.o Secured Land Fill.o ETP for leachates.o Lab for analytical purposes.• There are 12 individual incineration facilities.• Madhya Pradesh SPCB has identified 4 hazardous waste dump sites in Ratlam and Maksi area.• 10 units in the state have their own Captive Secured land Fill Facility.• MPSIDC has also identified a site-admeasuring about 50 Acres located in Pithampur for the said purpose and have called for tenders. Following a tendering process, RamkyEnviro Engineers Limited has been selected to take up the job on a BOOT basis, which has been developed in the name of ‘Madhya Pradesh Waste Management Project’ a division of RamkyEnviro Engineers Limited. M/s. M.P. Waste Management Facility (RamkyEnviro Engineers Ltd.) has been granted consent to establish under Waster & Air Act (on 05-09-2005) as well as Authorization under the Hazardous Waste (M&H) Rules (on 04-10-2006) for Common TSDF by MPPCB at Plot No. 104, Industrial Area No. II, Pithampur, Dist. Dhar.¹⁸⁴
--	---

184 Available at: <http://www.mppcb.nic.in/ctsdhfn.htm> (Last accessed on 11 November, 2019).

<p>Maharashtra</p>	<ul style="list-style-type: none"> • In Maharashtra, the HSM Division under Maharashtra SPCB deals with implementation of the policies with regard to hazardous waste management. As of 2009, the total quantity of waste generated was 1568368 MTA.¹⁸⁵ • A total of 6353 authorizations were granted to Hazardous Waste generating units in Maharashtra State. the highest number of authorizations granted to HW generating units were in Pune Region – 1311 (21%) followed closely by Kalyan Region – 905 (14%). The lowest number of authorizations granted was seen to be in Amravati Region – 80 (1%)¹⁸⁶ • Activities undertaken by Maharashtra SPCB are as follows: <ul style="list-style-type: none"> - It has taken various steps for its proper treatment and disposal by way of issuing notices and levy of fine. - Regional officer (HQ) was representative from the Board for preparation of Guidelines for storage of incinerable Hazardous Waste by the operator of CHWTSDF and captive hazardous waste incinerator. - Regional Officer (HQ) is also committee member for finalization of amount needed toward maintenance of Esrow/Corpus fund/ Contingency fund/ Insurance policies etc., for post monitoring of CHWTSDF. - Regional Officer (HQ) has prepared circular for disposal of date expired/discarded medicines and drugs. Also prepared circular for industry generating spent solvents and its reprocess. - Board is carrying out Environmental Audit with respect to licence quantity for manufacturing and waste generated out of it. - Board has developed software for keeping track on hazardous waste generating units in Maharashtra. - Installation of GPS for tracking of vehicles transporting hazardous waste is activated. - The Board has taken keen interest to implement rules under the Manufacturing Storage and Import of Hazardous Chemical Rules, 1989 wherein it is obligatory for importers of Hazardous Chemical to inform Board prior to receiving the consignment at port. After receiving the letter with documents from importers, the Board would
---------------------------	---

185 Available at: <https://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlbmrvcnlfzmluywxfcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

186 Available at: <http://www.mpcb.gov.in/node> (Last accessed on 11 November, 2019).

	<p>inform the Customs to clear the consignment. Board has prepared proposals to start issuing NOC to such importers.</p> <ul style="list-style-type: none"> - Maharashtra SPCB in association with CPCB has organized various one day seminars for awareness among public and stake holders for better implementation of Battery (Management & Handling) Rules 2001.¹⁸⁷ - Lists of authorized hazardous waste transporters, reprocessors / recyclers granted registration for environmental sound management of hazardous waste and industries authorized by Board for distillation of Spent Solvents are available.¹⁸⁸ - Common facilities for management of Hazardous Waste have been set up at Taloja, Mahape, Ranjangaon and Butibori.¹⁸⁹ - There are 4 Common Hazardous Waste Treatment, Storage & Disposal Facilities (CHWTSDF) installed and operating successfully in the State of Maharashtra. 2 facilities namely Mumbai Waste Management (MWM), Taloja and Trans Thane Waste Management Association (TTCWMA), Mahape, are located under Navi Mumbai Region; 1 facility namely Maharashtra Enviro Power Ltd (MEPL), Ranjangaon is located in Pune Region and Vidharbha Enviro Protection Ltd. (VEPL), Butibori Industrial Area is located in Nagpur Region. Presently 6353 industries are members of these 4 facilities and are disposing their hazardous waste.
Manipur	<ul style="list-style-type: none"> • As of 2009, the total quantity of waste generated was 252 MTA.¹⁹⁰ • It has 264 number of hazardous waste generating units as of 2010.¹⁹¹ However, its contribution towards waste generation of this kind is considered to be negligible. The last inventory it submitted to the CPCB was in 2008.¹⁹²

187 Available at: <http://mpcb.gov.in/images/pdf/hwachievements1011.pdf> (Last accessed on 11 November, 2019).

188 Available at: <http://mpcb.gov.in/hazardous/hazardousmgt.php> (Last accessed on 11 November, 2019).

189 Available at: http://www.mpcb.gov.in/sites/default/files/about-us/annual-report/mpcb_ar_2017-18_english_final_01032019.pdf (Last accessed on 11 November, 2019).

190 Available at: <https://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlnrvnclfzmluywxfcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

191 Available at: http://environmentclearance.nic.in/writereaddata/form1a/homelinks/tgm_comman%20hazardous%20waste%20treatment_010910_nk.pdf (Last accessed on 11 November, 2019).

192 Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlnrvnclfzmluywxfcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">• There is presently no more information available on the status of hazardous waste management in the State.
Meghalaya	<ul style="list-style-type: none">• As per 2016-17, the total quantum of hazardous waste generated was 75.8 MTA.¹⁹³ Total quantity of Hazardous Wastes generated amounts to 447.435 MT.¹⁹⁴ There is a proposal for the development of Common Hazardous Waste Treatment Storage & Disposal Facility. There is no treatment process is being followed for hazardous wastes generated by the units. Since, a centralized hazardous waste management facility is not in existence in the State of Meghalaya or the neighbouring State, the units store their landfillable waste within their own premises in a concrete lined pit. The recyclable wastes are sold to registered recyclers for recycling.• Government of Meghalaya is in the process of identification of suitable common landfill site in the vicinity of the Export Promotion Industrial Park. The Meghalaya SPCB is also exploring the possibility of sharing the common facilities to be established in the neighbouring state of Assam in co-ordination with the Assam SPCB.¹⁹⁵
Mizoram	<ul style="list-style-type: none">• The total number of Hazardous wastes generating units is 28.¹⁹⁶• There is presently no more information available on the status of hazardous waste management in the state.
Nagaland	<ul style="list-style-type: none">• It has 2 number of hazardous waste generating units as per the inventory report of hazardous wastes for 2015-2016 submitted by Nagaland

193 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

194 Available at: <http://megspcb.gov.in/form/revised%20inventory%20of%20hazardous%20waste-2017.pdf> (Last accessed on 11 November, 2019).

195 Available at: http://cpcb.nic.in/displaypdf.php?id=ahdtzc9o_zxdjdgvtxe0nv_9od19pbnzlnbrvcnl_fmlyuwxfcmvwb3j0xziwmdkucgrm (Last accessed on 11 November, 2019).

196 Available at: <https://www.indiastat.com/table/environment-and-pollution-data/11/solid-waste/261/1234223/data.aspx> (Last accessed on 11 November, 2019).

	<p>SPCB.¹⁹⁷ As of 2016-17, the total quantity of waste generated was 10 MTA.¹⁹⁸</p> <ul style="list-style-type: none"> • A common TSDF for the North East States is to be set up in Assam for which the Assam PCB is taking the initiative.
Orissa	<ul style="list-style-type: none"> • There are five nos. of Hazardous Waste Generating Units operating in the City. As of 2016-17, the total quantity of hazardous waste generated was 595697.8 MTA.¹⁹⁹ These units generate Battery Waste, ETP Sludge, Used Oil, Used Battery and Chemical Residue type of Hazardous Waste.²⁰⁰ • Lists of actual users (processor/recyclers) inside and outside Odisha and list of Industrial Units/Mines having valid authorization of SPCB are available.²⁰¹ • A common TSDF has been commissioned in 2010 by M/s Ramky Environ Engineer Ltd.²⁰²
Pondicherry	<ul style="list-style-type: none"> • It has 127 number of hazardous waste generating units as of 2016-17.²⁰³ • Requests were sent to Tamil Nadu SPCB, Chennai, and Andhra Pradesh SPCB to permit Pondicherry PCC to share the TSDF of these states for disposal of land fillable Hazardous waste generated in U.T. of Puducherry until a suitable site is identified by Government of Puducherry. Both the Boards have informed their inability to share the TSDF available in their States as well as for Transboundary Movement of Hazardous wastes. Thus, it was decided to have its own arrangements like installation of

197 Available at: <http://cpcb.nic.in/openpdffile.php?id=uhvibgljyxrpb25gawxllze5mzjfmtuyotu4mzi1nf9tzwpyxbob3rvmtc2ndcucgrm> (Last accessed on 11 November, 2019).

198 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

199 *Ibid*.

200 Available at: <http://orienvic.nic.in/index1.aspx?lid=31&mid=1&langid=1&linkid=29> (Last accessed on 11 November, 2019).

201 Available at: <http://ospcboard.org/divisions/waste-management-division/hazardous-waste-management/> (Last accessed on 11 November, 2019).

202 Available at: <http://ospcboard.org/wp-content/uploads/2017/01/annexure-iv-1.pdf> (Last accessed on 11 November, 2019).

	incinerator / Secured Land filling as per the CPCB guidelines. A meeting with the Hazardous waste generators was conducted to evolve of hazardous waste.
Punjab ²⁰⁴	<ul style="list-style-type: none"> As of 2016, 3136 industries generating Hazardous Waste in Punjab. As of 2016-17, the total hazardous waste generated was 115490.1 MTA.²⁰⁵ Common Hazardous Waste disposal facility Installed at Vill. Nimbuan, Dera Bassi in an area of 21 acres.²⁰⁶ The PPCB is responsible for collecting data and inspecting and ensuring proper storage/disposal of hazardous waste in the state. All major hazardous waste units in the state have installed captive incinerators in their premises. Now a Common Treatment, Storage and Disposal Facility (TSDF) has been set up at village Nimbuan, District Mohali. The entire industrial hazardous waste from Punjab is being stored/disposed at this facility. The PPCB is also currently laying emphasis on promotion of clean and no-waste industrial technologies/processes in the state and organizing awareness programs.
Rajasthan	<ul style="list-style-type: none"> According to Annual report 2014-15 number of hazardous waste producing industries is 464 industries.²⁰⁷ As of 2016-17, the total quantity of hazardous waste generated was 724663.2 MTA.²⁰⁸

203 Available at: <http://www.indiaenvironmentportal.org.in/files/file/annualenvtsurveyreport2011-2012.pdf> (Last accessed on 11 November, 2019).

204 Available at: <http://punenvis.nic.in/index2.aspx?slid=294&sublinkid=1135&langid=1&mid=1> (Last accessed on 11 November, 2019).

205 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

206 Available at: <http://punenvis.nic.in/index2.aspx?slid=294&sublinkid=1135&langid=1&mid=1> (Last accessed on 11 November, 2019).

207 Available at: <https://www.indiastat.com/table/environment-and-pollution-data/11/solid-waste/261/1234223/data.aspx> (Last accessed 11 November, 2019).

208 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none"> • A TSDF set up for the disposal of land disposable hazardous waste in 2007. There are 5 individual incineration facilities. • Common TSDF located in Rajasthan does not have adequate capacities to accommodate the present quantities of land disposable hazardous waste.²⁰⁹
Sikkim	<ul style="list-style-type: none"> • As of 2016-17, the total number of hazardous wastes generated was 785.472 MTA.²¹⁰ • CAG Report for Sikkim for the year 2015 reports the following²¹¹: • 1,721.16 MT of hazardous wastes were generated against which only 619.04 MT was disposed of at TSDF at Haldia in West Bengal and the remaining 1,102.12 MT of untreated hazardous waste were not transported through TSDF. No records available with the Sikkim SPCB as well as with industries as to how these wastes were disposed of. • It was seen that Sikkim SPCB had not compiled such inventory using the annual returns furnished by the occupiers/operators as on date of audit (July 2015). • While doing physical inspection (15-16 July 2015) of industries it was seen that most of these industries kept huge quantity of hazardous waste/sludge which had accumulated for more than ninety days, that was neither disposed of in time nor any extension of time was sought from the Board. There is presently no more information available on the status of hazardous waste management in the state.

209 Available at: <http://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlbmrvcnlfzmluywxfcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

210 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

211 Available at: https://cag.gov.in/sites/default/files/audit_report_files/chapter_5_general_sector.pdf (Last accessed on 11 November, 2019).

Tamil Nadu	<ul style="list-style-type: none">• As of 2016-17, the total quantum of hazardous waste generated was 383189.2 MTA.²¹² TNPCB has identified 3,545 units generating hazardous wastes and issued authorization under the rules. In Tamil Nadu about 6.91 lakhs tons of hazardous waste is annually generated in which 2.97 lakhs tones is landfillable, 3.42 lakhs tones is recyclable and 0.52 lakhs. tones is incinerable. As of 2009, the total quantity of waste generated was 258647 MTA.²¹³• The following activities are undertaken by TNPCB.²¹⁴<ul style="list-style-type: none">• The Board is taking effective steps in handling and management of hazardous wastes, its treatment and disposal in an environmentally safe manner. One common hazardous waste Treatment Storage and Disposal Facility (TSDF) has been established at SIPCOT Industrial Estate, Gummidipoondi and another TSDF at Unduorumikidakulam village in Virudhunagar district is in operation.• TNPCB has taken pioneering efforts to utilize the hazardous waste generated from Common Effluent Treatment Plants (CETPs) of textile processing units as fuel/raw material for co-processing in the cement factories. So far, about 50,000 Tonnes of ETP sludge have been disposed to various Cement industries for co-processing. Similar trails are being taken-up for using hazardous waste generated from tannery CETPs in co-processing in the cement factories. A common facility for pre-processing of hazardous waste has been established in Ranipet. The facility pre-processes the hazardous waste so as to use the same for co-incineration in cement kiln.
-------------------	---

212 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

213 Available at: <https://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze0nv9od19pbnzlbmrvcnlfzmluywxfcmvwb3j0xziwmdkucgrm> (Last accessed on 11 November, 2019).

214 Available at: <https://www.tnpcb.gov.in/hazardous-waste-managment.php> (Last accessed on 11 November, 2019).

Tripura	<ul style="list-style-type: none"> As of 2016-17, the total quantum of hazardous waste generated was 270.19 MTA.²¹⁵ Most of the production units in Tripura are small-scale in nature and most of them do not available the Material Safety Data Sheet (MSDS). Therefore, inventorisation of hazardous waste for this state can only be done on the basis of medium-scale and large-scale industrial units. Based on the available information an inventory of hazardous waste generating units has been prepared by the National Productivity Council in 2001.²¹⁶ The total quantum of hazardous waste generated amounts to 1847.694 MT/year excluding the latex industries as of 2001. Following are the different industrial sectors storing and using hazardous chemicals in Tripura:²¹⁷ <ul style="list-style-type: none"> Gas gathering stations Drug intermediate (Diosgene) producing unit Latex processing unit LPG bottling plant Bottling plant of alcoholic beverages Gas distribution pipelines
Uttar Pradesh	<ul style="list-style-type: none"> As of 2016-17, the number of hazardous waste generating industries was 2334.²¹⁸ As of 2009, the total quantity of waste generated was 169294 MTA.²¹⁹ Activities taken up by the Uttar Pradesh SPCB²²⁰

215 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

216 Available at: <https://tspcb.tripura.gov.in/wman.htm> (Last accessed on 11 November, 2019).

217 Available at: <http://orienviis.nic.in/files/state%20of%20environment%20report%20-%20tripura.pdf> (Last accessed on 11 November, 2019).

218 Available at: <https://www.indiastat.com/table/environment-and-pollution-data/11/solid-waste/261/1234223/data.aspx> (Last accessed on 11 November, 2019).

219 Available at: https://cpcb.nic.in/displaypdf.php?id=ahdtzc9ozxdjdgvtxze_0nv9od19pbnzlbnrvclfzmluywxfcmvwb3j0xziwmdkucgrm (Last accessed on 11 November, 2019)

220 Available at: http://upenviis.nic.in/database/household_wastes_829.aspx (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">- Closure of 45 units operating without any authorization or in violation of authorization issued under HWM Rules- Hazardous waste generating units have been directed to display relevant information through public notices and through conditions of authorization.- Out of total inventoried 2159 units, 442 units are reported to be closed for more than 03 months & 12 units are dismantled. Thus, 1705 units are operational out of which 1705 units have installed display boards.- 5 illegal dumping sites were identified in various parts of the State.- ITRC, Lucknow was short listed for risk assessment/ EIA/ remediation plan for illegal dump sites. ITRC has submitted preliminary report which has been submitted to CPCB.- Directions have been given through public notices that hazardous waste shall in no case be disposed in open and/ or illegal dumping sites.- Pesticide waste lying in the old brick kiln at Deva Road, Barabanki has been shifted to TSDF, Kumbhi, Kanpur Dehat by the responsible Industry and the site is being used as new car parking area by private firm.- Now by the introduction of clean energy fund, CPCB is now to make DPR for cleaning up the waste and ground water remediation at three illegal dumpsites i.e. Khanchandpur, Juhi Baburia Kanpur and Deva Road Barabanki.- Lohianagar Ghaziabad areas ground water has been found to be contaminated with Cr+6 although there is no hazardous waste lying anywhere now. The Lohianagar ground water is being remediated for Cr+6 by industries as per directions given by UPPCB. The same has been informed and is first of its kind in India.- A Nodal cell for the Management of Hazardous Wastes has been constituted at the Board's Head Office which looks after Hazardous waste management along with other assigned routine works.
--	--

	<ul style="list-style-type: none"> - Common TSDFs for Hazardous Waste disposal are operational/ being developed/ capacity exhausted at 4 sites in Uttar Pradesh. - Apart from common TSDFs, three industries have their own captive secured land fills. - A Booklet printed on Hazardous Waste Management in Uttar Pradesh in 2007, along with Industrial Hazardous Waste Inventory and sent to MOEF and CPCB. - Inventory of Hazardous Waste generating units published in 2007 and revised in April 2010 has been put up on Website www.uppcb.com and published. - 281 number of identified Hazardous industries, either recycle or reuse their waste, therefore, they are not required to take the membership of any TSDF.
Uttaranchal	<ul style="list-style-type: none"> • As of 2016-17, the amount of industries generating hazardous wastes are 3671.²²¹ • Uttaranchal has maintained an Inventory of Hazardous Waste Management for which data until 2016-2017 is available.²²²
West Bengal	<ul style="list-style-type: none"> • At present there are more than nine hundred (900) nos. hazardous waste generating units in the State. • As of 2016-17, the total quantity of waste generated was 85848.74 MTA.²²³ <p>The activities undertaken by the West Bengal Pollution Control Board are as follows:²²⁴</p>

221 Available at: <https://www.indiastat.com/table/environment-and-pollution-data/11/solid-waste/261/1234223/data.aspx> (Last accessed on November 11, 2019).

222 Available at: [http://ueppcb.uk.gov.in/files/industry-wise-annual-inventory-hazardous-waste-2016-2017-all-district-combined-final_\(3\).pdf](http://ueppcb.uk.gov.in/files/industry-wise-annual-inventory-hazardous-waste-2016-2017-all-district-combined-final_(3).pdf) (Last accessed on November 11, 2019).

223 State-Wise Hazardous Waste Generation (2016-17), Ministry of Environment, Forest and Climate Change, Government of India. Lok Sabha Unstarred Question no. 4553 Answered on 19.07.2019 by Minister of State in the Ministry of Environment, Forest and Climate Change, Available at: <http://www.indiaenvironmentportal.org.in/files/file/generation%20of%20waste.pdf> (Last accessed on 11 November, 2019).

224 Available at: <https://www.wbpcb.gov.in/hazardous-waste-management> (Last accessed on 11 November, 2019).

	<ul style="list-style-type: none">- There is one(1) no. Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWT/SDF) located at Purba Srikrishnapur, Haldia, Purba Medinipur that caters to all units in the state.- The CHWT/SDF, named M/s West Bengal Waste Management Ltd., was developed jointly by the Haldia Development Authority (HDA) and M/s Ramky Enviro Engineers Ltd., a Hyderabad based company under a Public Private Partnership (PPP). The development was facilitated by the Department of Environment, Govt. of West Bengal and MoEF, Govt. of India through financial assistance of Rs. 2 crores each.
--	--

5.9 HANDLING AND MANAGEMENT OF HAZARDOUS CHEMICALS IN STEEL SCRAP UNDER THE STEEL SCRAP RECYCLING POLICY, 2019

5.2.9.1. INTRODUCTION

The Ministry of Steel, Government of India, recently passed the Steel Scrap Recycling Policy, 2019 which promotes the establishment of metal scrapping centers in India and facilitates recycling of ferrous, non-ferrous and other non-metallic scraps. The policy lays down a standard framework and guidelines for collection, dismantling and shredding activities in an environmentally sound manner. The proposed policy imposes certain compliances like increased registration charges for private vehicles and increased fitness certification charges for transport vehicles to de-incentivize such vehicles.²²⁵ The objectives of the Steel Scrap Recycling Policy, 2019 are:

- a) To promote circular economy in the steel sector;
- b) To promote a formal and scientific collection, dismantling and processing activities for end of life products that are sources of recyclable (ferrous, non-ferrous and other non-metallic) scraps which will lead to resource conservation and energy savings and setting up of an environmentally sound management system for handling ferrous scrap;

²²⁵ Vehicle Scrapage Policy May Bring in Stricter Fitness Norms for Pre-2005 Built Vehicles, The Economic Times, Available at: http://economictimes.indiatimes.com/articleshow/71358745.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst. (Last accessed on November 19, 2019).

- c) Processing and recycling of products in an organized, safe and environment friendly manner;
- d) To evolve a responsive ecosystem by involving all stakeholders;
- e) To promote 6R's principles of Reduce, Reuse, Recycle, Recover, Redesign and Remanufacture through scientific handling, processing and disposal of all types of recyclable scraps including nonferrous scraps, through authorized centers/facility; and
- f) To create a mechanism for treating waste streams and residues produced from dismantling and shredding facilities in compliance to Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 issued by MoEF & CC.²²⁶

The endeavor is to develop a globally competitive market and at the same time to adopt a state of art environmentally benign technologies for disposal of scrap wastes.

System of Shared Responsibility - The prime feature of policy is the system of shared responsibility, which would enable the development of appropriate ecosystem in terms of setting up of Collection, Dismantling centers and Scrap processing centers, either by independent entrepreneurs or through Joint Ventures between Corporate entities and/or PSUs. The responsibility is shared among five stakeholders.

Dismantling & Scrap Processing Centers (SCs) - The scrapping centre may develop facilities, to segregate the processed scrap, based on its composition or chemical analysis, which would facilitate the downstream industries with quality scraps.

Manufacturers and Extended Producer Responsibility - The Ministry of Road Transport and Highways (MoRTH) and Department of Heavy Industry (DHI) work towards "Extended Producer Responsibility" by requiring the vehicle manufacturers to incentivize the owners of ELVs to voluntarily give their vehicles for scrapping in exchange for price discounts for purchase of new vehicles. This will also provide for the required feed to the scrapping centres. The collection and dismantling center and scrap processing center must issue a Certificate of Destruction (COD) / Proof of scrapping to the owner

²²⁶ The Scrap Policy 2019, The Gazette of India, Available at: <https://steel.gov.in/sites/default/files/213770.pdf>. (Last accessed on November 19, 2019).

of the End of Life Vehicle. The engine parts arising out of the end of life vehicles should be defaced, or drilled with 6" hole, by the scrapping centres, such that the same may not be reused in the secondary market.

5.2.9.2. USE AND TREATMENT OF HAZARDOUS SUBSTANCES AND WASTE

One of the primary objectives of the Policy is to ensure that the waste streams and residues which is produced from the dismantling and shredding facilities is treated in compliance with the Hazardous & Other Wastes (Management & Transboundary Movement) Rules of 2016 and relevant health and safety regulations. The responsibility to reduce the use of hazardous substances and treatment of waste generated is two-fold. The responsibility of the Centers should promote a zero discharge system with a depollution system for processing the end of life goods and scraps. It shall also have storage for hazardous substances like batteries and condensers. In case they don't have adequate facilities to recycle hazardous waste, it should be sold to authorized recyclers who have adequate capability through a government authorized e-commerce/auction portal. The responsibility of the automobile manufacturers is to ensure that the use of lead, mercury, cadmium and other hazardous materials and substances of concern should be avoided as they do not become a part of the residue and cause air and water pollution. Thus, the use of recycled materials in the new products should be promoted to keeping in mind the recyclability of the end of life vehicle. Manufacturers should also undertake responsibility to make adequate provisions relating to the classification, packaging, labeling and color scheme for dangerous substances. The centers deal with ferrous and nonferrous scraps, and ELVs which should produce hazardous waste impacting the environment. Thus, the Policy provides for the adoption of state-of-the-art environmentally friendly technologies. The centers should strictly adhere to the statutes and rules issued by the Ministry of Environment, Forest and Climate Change like Environment (Protection) Act, 1986, Water and Air (Prevention and Control of Pollution) Acts, Guidelines for environmentally sound management of ELVs, 2016 laid down by Central Pollution Control Board (CPCB)- AIS 219, Waste regulations notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC), as applicable for the management and recycling of ELVs, etc.

LAW ON EMERGENCY, REMEDIAL AND PENAL ACTION IN RELATION TO HAZARDS CAUSED BY CHEMICAL WASTE

6.1 INTRODUCTION TO CHEMICAL ACCIDENTS AND DISASTERS: AN OVERVIEW

Rapid industrialization which has seemed to engulf the country also has significantly increased the risk of vulnerability of the environment, both human and natural. With the number of factories and industries coming up, the nature of the industrial age is also evolving. The change and evolution of technology has a seminal role to play in it. It is but natural that when development happens too quickly in a very short span of time, the risk of accidents and mishaps increases a lot more. While the industrial units are increasing in size as well as number, to ease the process and method of setting up and doing business is getting simpler. Lesser compliance procedures and simpler setting up processes is making this industry thrive and grow. Common causes of chemical accidents are deficiencies in safety management, human errors, sabotage and even natural disasters and calamities. These accidents result in fire endangering life and property, release of toxic gases and fumes or leakage of chemicals into the surrounding atmosphere and ground highly toxic and uninhabitable for life. Every time such an event occurs, big or on a small scale, it has a detrimental effect on human and natural life and thus, certain criterion must be met in terms of reporting such an occurrence.

At various levels, a number of bodies and authorities are involved which need to take action for ensuring that the damage as caused is not enhanced and the safety of the plant has to be assessed to determine whether or not the chemical facility is fit to stay in operation. Ever since the accident in the Union Carbide Factory in Bhopal and the disastrous effect it had on the residents then and for years to come, the mechanism of

making the chemical industries and factories safe for the people working in them, the surroundings and making their operations environmentally benign, set stringent measures have been laid down under various laws, rules and regulations. Similarly, the transport and handling of chemical and hazardous substances, their storage, its use and eventually disposal, is all governed by laws and regulations. In the event of any mishap, incident or untoward accident, the occupier of the chemical facility, whether private or publicly owned, has liability to compensate for the damage caused, document in detail about the cause of the incident and submit all reports within a given period of time to all requisite authorities. Only after a scrutiny is when the defaulted facility granted permission to start operations again.

Moving ahead, it is to note that the chemical industries are spread over a couple of States and the ones involving the import and export of chemical and hazardous substances, are mostly found in the states of Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu, Karnataka, West Bengal and some fertilizer and pesticide industries in Punjab and Haryana. The initiatives taken in these particular states must be studied with respect to hazardous waste management and the preparedness and plan in case of an untoward accident or incident. The industry being highly polluting and having high potential of causing permanent damage to nearby environment, the norms and regulations for environmental safety are strict, along with the regular checks and inspections from appropriate authorities. The most likely effects are contamination of the soil, groundwater, water bodies, toxicity which lasts for decades, mutations of the human and plant genetic structures, chemical residue in food, fire resulting in loss of life and property etc. occupational health, transport, storage and disposal are main thrust areas which require proper risk assessment and studies and plans to reduce these risks. The absence in one place, of a detailed database, which tracks the same, is a gap and a shortcoming which must be filled expediently, in order to make risk assessment and reduction possible on a priority basis.

With a diverse spectrum of the chemical industry which is thriving in the country, there are a host of regulations and laws which are laid down, governing each and every aspect of the management of chemicals and hazardous substances. On a Central as well as on the State level, there are functional authorities who have been tasked to regulate, monitor

and abate the risks as possessed by this industry. There even are detailed rules on the action which ought to be taken, in case of an accident, and how best to be prepared for one, which has been discussed in the earlier chapters; however, we shall be looking into more of a critique of the same, thus finding some suggestions to better the same. As brought together by a National Chemical Management Profile for India¹ the Environment (Protection) Act, 1986 serves as an umbrella Act and can link other Acts in one way or another, without interfering with the autonomy of any other Acts / Rules. Various Ministries at Central and State level with their regulatory agencies are responsible for implementing the respective laws. The Environment (Protection) Act, 1986 links the multilateral environmental agreements through various rules such as Hazardous Waste (Management and Handling) Rules, 1989 amended in 2000 and 2003 with the Basel Convention and Ozone Depleting Substances (Regulation and Control) Rules, 2000 with Montreal Protocol- in addition, it serves as an umbrella Act and can link other Acts in one way or another, without interfering with the autonomy of any other Acts / Rules. Since the Ministry of Environment & Forests is the nodal ministry for enforcement of the Environment (Protection) Act, 1986 and thereby the co-ordinating ministry for management of chemicals. The Ministries of Commerce and Finance take care of import and export. The Ministry of Health and Ministry of Agriculture with their concerned laws handle consumer interest. Ministry of Surface Transport and Ministry of Shipping ensure implementation of transportation laws. Labour Ministry is concerned with safety and occupational health and the Industry Ministry is concerned with use of explosives.

This brings us to the question that despite having many regulations in place, why challenges and issues still exist, such as inspection, vigilance and public awareness about the dangers and abatement processes of chemical and hazardous substances. Another issue which is pertinent is that despite the numerous regulations prompting to the number of reports to be submitted in the event of an accident, about the causal factor, the method in which the issue was handled and the laws of public insurance liability as followed are all consolidated in one place and made public documents. This aide's transparency and boosts public confidence in the institutional framework. There is also a multitude of bodies which have been constituted to look into the affairs of the dealing with chemicals

¹ Prepared by Ministry of Environment Forests and Climate Change & the Central Pollution Control Board, with assistance from United Nations Institute for Training and Research.

and hazardous substances when there has been an accident, for instance, the Central Crisis Group which has been setup under the 1989 Rules, to look into the management of the chemical accidents, the committees constituted in consultation with NGOs and Industry associations to look into occupational health and safety, under the Factories Act, to ensure that prior information has been given out in case of hazardous factories etc.. Maintaining an inventory of hazardous substances is also very scattered as the same is maintained under the various lists and annexures as provided under the various International Conventions.

6.2 CHEMICAL AND HAZARDOUS SUBSTANCE ACCIDENTS AND DISASTERS: AN OVERVIEW OF ENVIRONMENTAL CONSEQUENCES

The World Health Organisation describes a chemical incident as an unexpected and an uncontrolled release of a chemical from its containment. More specifically, a chemical incident which affects the health of the public at large, where two or more people are at risk of being exposed or are exposed to a chemical. This release is understood as ‘acute’ if the exposure dose is rising rapidly and is understood as ‘chronic’ when the dose is not rising rapidly and emergency health measures need not be carried out rapidly. However, it does not mean that the latter does not pose threat of fatality or illness to the exposed public. These chemical incidents and accidents have affected the people and the environment in many ways, such as causing an explosion and the effects of the resultant fire, toxicity of the chemicals and the reaction of these chemicals with human and animal life, causing poisoning, burning and irritation of the skin and eyes, respiratory disorders and even instant death. It poisons and contaminates the soil wherever the chemicals seeps into the ground, thus altering the composition of the soil, pollutes the air by affecting hundreds of people at once and carries the risk of being spread to other neighbouring towns and cities as well, thus causing a vast number of people to be at risk from the chemical leak. While some chemical accidents and leaks cause immediate effect of causing respiratory and skin issues, some more deadly chemicals cause the human and animal gene pool to be affected and thus the health issues which are potentially fatal to start surfacing months and even years after the exposure. The leak in Chernobyl and the leak in the Union Carbide Factory were such examples where not only did people die instantly,

but many generations in the coming years were affected. The state of the environment as well suffers in the process as with the soil contaminated, there are high chances of the chemical entering into the food chain and never leaving the plant. Similarly, chemicals in the gaseous form such as Benzene, Amonium Nitrate etc, cause acid rain and contaminate large patches of land and pollute even the water bodies.

Following are some of the worst cases of chemical accidents around the world, which have had a consequence on the human and the natural environment over the years.

6.3 CHEMICAL ACCIDENTS AROUND THE WORLD: IMPACT ON THE STATE OF ENVIRONMENT

6.3.1 ICMESA, CHEMICAL MANUFACTURING PLANT: THE SEVESO DISASTER IN 1976

This incident took place in Italy, just outside the city of Milan, where a small chemical manufacturing plant suffered a mishap and resulted in the exposure of the highest amount of tetrachloridebenzo-p-dioxin (TCDD) in a residential population. The owner of the plant was the company ICMESA (*Industrie Chimiche Meda Societa Azionaria*) which is a subsidiary of Givaudan, which was further a subsidiary of Hoffmann-La Roche. During the production of this chemical, it was an exothermic reaction which led to a mismanagement of the heat and failure of adequately cooling the same. The chemical-release accident was triggered by an interruption in a batch process before the final step in the process could be completed i.e. removal of ethylene glycol from the reaction mixture by distillation. This interruption occurred to show conformity with an Italian law which required shutdown of plant operations over the weekend. Other parts of the site had already begun the process of closing down as the processing of other batches was completed. This led to reduction in power consumption throughout the plant, which caused a dramatic drop in the load on the turbine. This increased the temperature of the exhaust steam to 300 °C approx. This steam was much hotter than the regular steam. It heated the portion of the metal wall of the accident reactor above the level of the liquid within it and brought it to the same temperature. The operators did not have a steam temperature reading among their instruments. They were unaware of this additional heating, so they stopped the batch in a normal manner i.e. by isolating the steam and

turning off the stirrer in the reactor vessel². This led to the heating of the adjacent reaction mixture by this abnormally-hot upper region of the reactor jacket. The stirrer was not operating and thus the heating was highly localised. It was primarily confined to the portion of the upper layers of reaction mixture which were next to the reactor wall. The local temperature was increased to the point of critical temperature for the exothermic side reaction as seen during testing phase. But later, the critical temperature was discovered and proved to be 50 °C lower than that was believed. At such lower critical temperature, a slow runaway decomposition began which released more amount of heat and led to beginning of a fast runaway reaction when the temperature climbed to 230°C seven hours later.³

The reactor valve erupted and caused the release of tonnes of chemicals which then spread settled over the nearby area. Within a couple of days, many dead animals, especially poultry and rabbits were discovered. Fearing the chemical would enter the food chain, many thousands of animals were slaughtered. Numerous children were hospitalised with skin inflammation and according to reports⁴ 447 people were found to be suffering from skin diseases like Chloracne. Fourteen years after the accident, a report in 1991⁵ proved that the most evident health effects was the skin disease and the earliest symptoms was peripheral neuropathy due to the exposure to the dioxin. A 2001 study⁶ confirmed in victims of the disaster, that dioxin is carcinogenic to humans and corroborate its association with cardiovascular- and endocrine-related effects. In 2009, an update including 5 more years (up to 1996) found an increase breast cancer. As an effort to clean-up after this accident, large scale medical monitoring was undertaken where the Italian government raised the value of compensation and the cases were settled out of court, the compensation amount was a total of 20 billion lire. Further, five former employees of ICMESA were sentenced to prison, the sentence ranged from 2.5-5 years.

2 Trevor A. Kletz, *Learning from Accidents* 103–109 (3 ed. Oxford U.K.: gulf professional) (2001).

3 Trevor A. Kletz, *What Went Wrong? Case Histories of Process Plant Disasters* (1998).

4 *Ibid.*

5 Bertazzi, Pier Alberto, *Long-Term Effects of Chemical Disasters. Lessons and Results from Seveso, the Science of the Total Environment*. 106 (1–2): 5–20 (1991).

6 Bertazzi, et al, *Health Effects of Dioxin Exposure: a 20-year Mortality Study*, *American Journal of Epidemiology*, 153 (11): 1031–1044, (2001).

However, where the Court of Appeal in Milan found three of the five, not guilty. But Finally, sentence against the remaining defendants was confirmed by the Supreme Court in Rome.

The protection operations handled with the combined efforts of the administrators of the company and local government have been nicely coordinated. However the incident was not disclosed publicly and at least a week elapsed before it caught public attention that dioxin emissions had occurred and evacuation commenced much later than it should have. As a result, the local populace was caught unaware when the accident happened and they were unprepared to tackle the spread of an invisible poison. The Industrial Safety Regulations as passed in European Community in 1982 were called the Seveso Directive. The Directive imposes very stringent regulations.

Towards the natural environment, the chemical substance TCDD, as per World Health Organisation⁷ are detailed as Persistent Environmental Pollutants (POPs) and their maximum detrimental effect is found on human beings. Though present in the environment in minute quantities, chemical releases of this TCDD is largely known to cause multiple organs and system failure in animals and human beings and long term exposure of humans to high levels of dioxins is linked to the impairment of immune system, nervous system, endocrine and reproductive systems.

6.3.2 S.S GRANDCAMP: AMMONIUM NITRATE FIRE (1947):

It is known as the deadliest and the most unfortunate accidents in the entire American history. This accident has been one with the highest number of human life loss. The accident took place on a French-registered vessel called SS Grandcamp and the cargo it was carrying, 2,100 metric tons of ammonium nitrate, which caught fire. A series of unfortunate events followed as this fire triggered many other fires and explosions in the nearby ships and oil-storage facilities, killing 581 people.⁸ This accident instituted the first of its kind lawsuit against the United States Government. The suit was instituted under the Federal Tort Claims Act, on behalf of the 8,485 victims.

7 Available at: <https://www.who.int/news-room/fact-sheets/detail/dioxins-and-their-effects-on-humanhealth> (Last accessed on November 16, 2019).

8 Hugh W Stephens, the Texas City Disaster, 1947, University of Texas Press, 100 (1997).

The district court found the United States responsible for a litany of negligent acts of omission and commission by 168 named agencies and their representatives in the manufacture, packaging, and labelling of ammonium nitrate, further compounded by errors in transport, storage, loading, fire prevention, and fire suppression, all of which led to the explosions and the subsequent carnage. The Dalehite decision was eventually “*appealed*” to the Congress, which granted relief by means of legislation.⁹ The lesson as learnt from this accident was the proper labelling and transport precaution that must at all times be practised while carrying chemicals which are explosive in nature and can cause an inexhaustible fire.

6.3.3. THIOKOL-WOODBINE EXPLOSION, 1971:

The accident happened in Georgia, where the group of factories which were engaged in the manufacturing of tripflares for the purpose of use in the Vietnam war. The primary compound used to make these flares is Magnesium which when burnt, produces a flame at very high temperatures which is not extinguishable by normal means. Water combines to create hydrogen gas, which is also highly inflammable gas and the use of carbon dioxide also is not helpful in extinguishing it. If burned in closed environment, there is a potentially high risk of building up of heat and pressure which may then detonate in an uncontrolled fashion causing a large amount of damage.

Once a small fire was observed, they were extinguished and no panic was created, however, when a conveyor belt caught fire, it was spread across the production line and reached to the storage room which contained five tons of processed materials and more than fifty thousand assembled flares.¹⁰ Dozens of employees were either killed, dismembered, or injured by the explosion and the resulting fire. Bodies were hurled to a height of about 400 feet¹¹ and debris was found more than four thousand feet from building M-132, which was levelled. Three other surrounding buildings were severely

9 *Ibid.*

10 Gordon Jackson, Memories Still Shake Florida Times-Union, February 4, 2001, Available at: https://www.jacksonville.com/tu-online/stories/020401/met_5309104.html. (Last accessed on November 16, 2019).

damaged, and the fire engulfed nearby pine trees, which started a forest fire that eventually scorched hundreds of acres

Twenty-four people were killed in the blast or died soon after. Five others later died from their injuries, primarily burns, for a total of 29 deaths. At least 50 individuals suffered debilitating injuries, including burns and limbs severed by the explosion. Thiokol and the Government were found to have contributed to the disaster through a series of communications failures, managerial mistakes and negligence that began long before the day of the accident.

A 1977 Federal court decision found both the Government and Thiokol liable for damages arising from the 1971 explosion. Under Georgia workers' compensation laws, however, Thiokol's exposure was limited to \$17,000 for each person killed and a lesser amount for those injured. The Government has been forced to pay the bulk of the damages awarded so far, more than \$7 million.¹² Local officials had participated in no disaster planning, and the scale of the accident overwhelmed the only hospital in the county, a small facility more than 20 miles from the plant. For the victims of the explosion and for their families, the disaster uncovered the deficiencies in state workers' compensation benefits and the weaknesses of the legal system in resolving conflicts between poor people and the Federal Government.

6.3.4. PHILIPS DISASTER, 1989:

A factory manufacturing highly flammable materials, suffered a terrible fate, when 23 workers were killed and 314 others gravely injured due to a number of explosions which occurred in this factory, located in Pasadena, Texas. The mishap occurred during the process of manufacturing where flammable gases were released from the facility, which was later discovered, to be a 'common practice' at this factory. After the accident took place, it was found that the safety valves, one for closing and other for opening were dysfunctional, which was a huge occupational safety risk. These flammable gases, instead of being released outside the factory, accumulated inside and came into contact with a

11 *Ibid.*

12 Available at: <https://www.nytimes.com/1986/07/20/business/a-tragedy-in-south-georgia.html> (Last accessed on November 16, 2019).

point of ignition, which resulted in a number of explosions. The strength of these explosions was measured 3.5 on the Richter Scale or equivalent to the explosion of 2.5 tons of TNT inside the plant.¹³

Upon investigation by the Occupational Safety and Health Administration, it was found that the plant was in grave violation of a number of safety regulations and codes. An excerpt from the OSHA report¹⁴ "...At the conclusion of the investigation (April 19, 1990), OSHA issued 566 wilful and 9 serious violations with a combined total proposed penalty of \$5,666,200 to Phillips 66 Company and 181 wilful and 12 serious violations with a combined total proposed penalty of \$729,600 to Fish Engineering and Construction, Inc., a maintenance contractor on the site."

Despite the ruthlessness of the Phillips Disaster of 1989, the Phillips plant was revived after upkeeps were made. Today, it employs hundreds of entities and still makes the same types of plastic compounds. Since the 1989 explosion, there have been three other major accidents, two of which resulted in loss of life.

6.3.5. WILLIAMS OLEFINS PLANT EXPLOSION, 2013:

A detailed case study¹⁵ as published by the United States Chemical Safety and Hazard Investigation Board, the disaster which occurred in this chemical plant at Louisiana has been described as catastrophic. Even though it killed two employees, the accident is a tough reminder about how the safety management of high-risk plants and factories must not be taken lightly at any given point of time. The incident occurred during a non-routine operational activity when the heat exchanger was offline which created pressure. The reboiler shell catastrophically ruptured, causing boiling liquid expanding vapour explosion and fire. Chemicals released were benzene and propane which are not environmentally benign. It also released 30,000 pounds of flammable petrochemical

13 A Look Back at the Phillips Disaster of 1989, the Daspite Law Firm, 2014. Available at: <https://www.daspitlaw.com/personal-injury-blog/2014/february/a-look-back-at-the-phillips-disaster-of-1989/> (Last accessed on November 16, 2019).

14 Available at: <http://envrionment.blogspot.com/2009/01/phillips-disaster.html> (Last accessed on November 16, 2019).

15 Available at: <https://www.csb.gov/williams-olefins-plant-explosion-and-fire-/> (Last accessed on November 16, 2019).

products and by-products into the air that day. According to the report, the facility released 31,187 pounds of volatile organic carbon material, including 23,090 pounds of propylene; 2,398 pounds of ethylene; 5,621 pounds of other volatile organic carbon materials, including propane; and 48 pounds of benzene. Also released were 85 pounds of soot and particulate matter.¹⁶

6.4 CHEMICAL ACCIDENTS IN INDIA: SHORTCOMINGS OF THE LEGAL REGULATIONS

6.4.1 CHASNALA MINING DISASTER

On 27 December 1975, a disaster struck the Chasnala colliery, near Dhanbad where a coal dust explosion in the deep mine led to a blast that damaged the roof barrier with a huge water body sitting above it. Owing to the formidable flooding of water into the mine, around 372 lives were lost. The explosion was said to be caused by sparks from equipment igniting a pocket of methane gas that is produced abundantly in coal mines¹⁷ While it was tragic that the explosion resulted in the loss of many lives, the environmental aftermath caused by the emission of methane into the atmosphere has been drastic. Methane being a short-lived greenhouse gas, traps energy quickly leading to a rise in the temperature. Upon mine explosions, large quantum of methane trapped underground is released into the atmosphere thereby deteriorating the air quality and increasing the atmospheric temperature.

According to a World Bank expert, the disaster was one which could have been avoided if the mine had not been built within sixty meters of the barrier.¹⁸ Under the Mines Act, 1952, coal mine owners are responsible for implementing provisions of safety laid down by the DGMS (Directorate General of Mines Safety) which was not abided by in this

16 Available at: https://www.nola.com/news/environment/article_f6c3672e-1a62-533e-a7d6-77e7ef8ff5b7.html (Last accessed on November 16, 2019).

17 Available at: <https://www.nsenergybusiness.com/features/worst-coal-mining-disasters/> (Last accessed on November 16, 2019).

18 Indian Coal Mines: Graveyard of Miners, K. V. Subrahmanyam, Economic and Political Weekly vol. 12, no. 32 (Aug. 6, 1977). 1252-1254.

situation. When the incident took place, there was no particular law that provided for the reporting and management of chemical disasters. As such, no action was taken and the colliery was forced to shut down. However, in connection with this disaster, two former Indian Iron and Steel Company (IISCO) officials were awarded imprisonment on a later date for their negligence in maintaining the mining site.¹⁹

6.4.2 GACL VADODARA

On 5 September, 2002, a major accident took place in a chemical unit in Nandesari, Vadodara when a tanker in the Gujarat Alkalies Chemicals Limited (GACL) premises exploded while filling chlorine. It was found out that the said explosion took place owing to the reaction of the chlorine with monochloroacetic acid traces in the container.²⁰ This incident took a death toll of 4 and injured 20 persons.²¹

The relevant laws that were applicable to prevent this disaster were under the Factories Act 1948. Section 41B (1) provides for the compulsory disclosure of dangers of a hazardous process. Furthermore according to sub section (4) the occupier is required to draw up an On-Site Emergency Plan & Disaster Control Measures for his factory. Further Rule 4 of the MSHIC (The Manufacture, Storage and Import of Hazardous Chemical Rules) 1989, requires notification of a major accident. These instances point the need of effective chemical management which has the propensity of being harmful and fatal.

6.4.3. CHEMICAL FACTORY DOMBIVILI, MUMBAI

The chemical factory blast in Dombivilli in 2016 resulted in the release of hexane and is known to be one of the major industrial accidents in India. The legal framework in

19 Available at: <http://www.sankalpindia.net/blog/chasnala-story-betrayal-independence> (Last accessed on November 16, 2019).

20 Available at: <https://www.icis.com/explore/resources/news/2002/09/09/180402/chemical-explosion-at-india-s-gacl-kills-3-injures-17/> (Last accessed on November 16, 2019).

21 Available at: <http://moef.gov.in/wp-content/uploads/2019/05/offsite-emergency-plan-guidelines.pdf> (Last accessed on November 16, 2019).

22 Press Information Bureau, Disasters and Accidents in Chemical Industries, 26-August-2010, Available at: <https://pib.gov.in/newsite/printrelease.aspx?relid=65303> (Last accessed on November 16, 2019).

order to deal with the chemical industrial accidents were the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended in 2000 and the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 and the Factories Act, 1948 (Amended) 1987.²² Although this incident has not been reported, there were subsequent instances of chemical factories resulting in fire and causing harmful effects. This incident brings to light the nature of the chemical industry being susceptible to fire hazards. The blast occurred in 2016, within the chemical manufacturing industry Probace Chemical factory in MIDC, Domblivali which resulted in massive fire which eventually damaged neighbouring factories within the MIDC.²³ Currently, there is an identification of Major Accident Hazard Units by the National Disaster Management Authority however a need is felt to revamp the legal framework with regard to chemical accidents.

6.4.4. MATRIX LABORATORY INCIDENT

The chemical accident which occurred in Matrix Laboratory Ltd. in Andhra Pradesh in 2005 caused casualties resulting in the death of 8 persons.²⁴ This accident throws light on the harmful nature of sodium hydride which caused the accident. Though there is no reporting of the incident except by recognising it as a chemical accident by the National Disaster Management Authority, it is clear that the widespread use of sodium hydride in the synthetic chemical industry without paying sufficient attention to the safety hazards poses a significant issue in safe handling of these chemicals.²⁵ The nature of sodium hydride is witnessed by its mixture with certain solvents which has a deeply combusive reaction which more often than not leads to an explosion.²⁶

23 PTI, Number of Deaths in Dombivli Factory Blast Near Mumbai Rises to 12, May 28, 2016, Available at: <https://www.ndtv.com/mumbai-news/number-of-deaths-in-dombivli-factory-blast-near-mumbai-rises-to-121412951> (Last accessed on November 16, 2019).

24 National Disaster Management Guidelines- Chemical Disasters, 2007 Available at: <https://nidm.gov.in/pdf/guidelines/new/chemicaldisaster.pdf>, (Last accessed on November 16, 2019).

25 Craig Tucker et. Al, Explosion Hazards of Sodium Hydride in Dimethyl Sulfoxide, N,N-Dimethylformamide, And N,N-Dimethylacetamide, Org. Process Res. Dev. 2019, 23, 10, 2210-2217, Available at: <https://doi.org/10.1021/acs.oprd.9b00276> (Last accessed on November 16, 2019).

26 Bethany Halford, Chemists Continue to Forget Safety Concerns about Sodium Hydride, Available at: <https://cen.acs.org/safety/lab-safety/chemists-continue-forget-safety-concerns-about-sodium-hydride/97/web/2019/08> (Last accessed on November 16, 2019).

With respect to the legal framework, currently there is a Chemical Laboratories- Code of Safety published by the Bureau of Indian Standards (IS 4209 : 2013) with respect to the safety measures to be adopted by laboratories.²⁷ This incident brings to light the need for safe handling of chemicals as their use can turn to be hazardous and in the absence of adequate lab safety practices can prove to be a threat to the safety and health of the workers in the synthetic chemical industry.

6.4.5. MAYAPURI RADIOLOGICAL INCIDENT

The incident took place in the scrap market of the Mayapuri Industrial Area in Delhi in 2010 as a result of exposure to radioactive emissions which proved fatal to one and caused injuries to six workers. The radioactive contamination of the imported steel scraps has said to be the cause of the mishap.²⁸ The exposure of the workers to the acute radiations emitting from the radioactive isotope Cobalt-60 caused the fatalities. Posing significant threat as occupational hazards for the safety of the workers coupled with a need to provide social security measures to the workers affected, an acute radiation of this sort has far-reaching consequences. The constant exposure to radioactive emissions in the absence of efficient radioactive emission management has the propensity to cause substantial harm in the form of health hazards to the workers who have adjacent dwellings in the industrial area. Subsequently, with the liability fixed on the Delhi University Chemistry Department, a NGT panel was set up to prevent the reoccurrence of such an incident and to review the steps taken by the government in this regard.²⁹ The accident garnered attention with respect to the effective radioactive emission management and cast a cloud of doubt on the role of Atomic Energy Regulatory Board (AERB) as an effective regulator of radiological safety in the country.

27 Indian Standard Chemical Laboratories — Code of Safety (Second Revision), Bureau of Indian Standards, 2013, Available at: <https://law.resource.org/pub/in/bis/s02/is.4209.1987.pdf> (Last accessed on November 16, 2019).

28 R. Ramachandran, Radiation Shock, Available at: <https://frontline.thehindu.com/static/html/fl2710/stories/20100521271002500.htm> (Last accessed on November 16, 2019).

29 PTI, National Green Tribunal Sets Up Panel to Inspect Mayapuri Scrap Market, Apr 05, 2013, Available at: <https://economictimes.indiatimes.com/national-green-tribunal-sets-up-panel-to-inspect-mayapuri-scrap-market/articleshow/19396293.cms?from=mdr> (Last accessed on November 16, 2019).

6.4.6. UNION CARBIDE INDIA LIMITED, 1984

At 11.00 PM on December 2 1984, while the greater part of the one million inhabitants of Bhopal dozed, an administrator at the plant saw a little hole of methyl isocyanate (MIC) gas and expanding pressure inside a capacity tank. The vent-gas scrubber, a security gadget planner to kill poisonous release from the MIC framework, had been killed three weeks earlier. Obviously a defective valve had permitted one ton of water for cleaning inside channels to blend in with forty tons of MIC. A 30 ton refrigeration unit that regularly filled in as a wellbeing segment to cool the MIC stockpiling tank had been depleted of its coolant for use in another part of the plant. Weight and warmth from the energetic exothermic response in the tank kept on building. The gas flare security framework was out of activity and had been for a quarter of a year. At around 1.00 AM, December 3, uproarious thundering resonated around the plant as a wellbeing valve gave way sending a crest of MIC gas into the early morning air. Inside hours, the roads of Bhopal were covered with human cadavers and the corpses of bison, dairy animals, canines and winged creatures. An expected 3,800 individuals kicked the bucket promptly, for the most part in the poor ghetto settlement adjoining the UCC plant. Neighbourhood emergency clinics were before long overpowered with the harmed, an emergency further intensified by an absence of information on precisely what gas was included and what its belongings were. It got one of the most exceedingly terrible synthetic fiascos in history and the name Bhopal got synonymous with modern calamity.

6.5 REFLECTING ON THE LEGAL FRAMEWORK: WHICH LAWS WERE APPLICABLE ?

The cause of these accidents in one way or the other has been caused by the direct and inevitable effect of the hazardous nature of the chemicals involved. From the Chasnala incident, it is quite evident that the legal framework prevalent at that time, i.e the Mines Act, 1952 did not effectively provide safeguards against the possible occupational hazards that emerge out of mining activities. The release of methane as a result of mining is something that ought to be anticipated owing to its highly combustible nature. Although the said legislation provided for the Occupier to take necessary measures in providing

for the safety of the miners in the event of any mining disaster, it did not cover in any aspect the foreseeable harm which is engendered with the nature of the chemical gases associated with the mining activity. Furthermore, the absence of any other legislation to deal with the intricacies of chemical accidents and the subsequent liability/responsibility upon person responsible for such accidents highlights the absolute inadequacy of the law to address such issues at that time. The Bhopal Gas Tragedy of 1984 created a sense of legal consciousness regarding the need for a specific legal framework to deal with the challenges posed by the ever-expanding growth of the Chemical sector in India. This being said, the post 1984 legal regime focussed on a rather compensatory approach which was ex-ante in nature and not on a preventive approach. While this change in the legal regime was a positive step, it proved ineffective to curb the occurrence of chemical accidents. From the incidents which took place in GACL, Matrix Laboratory and the Probace Chemical factory in MIDC, it is evident that the aspects of safe handling of chemicals were pressing issues which were required to be specifically addressed. The chemicals being hazardous in nature require a comprehensive regulatory framework with respect to their use, manufacture and handling. The very fact that these incidents have not been reported by the respective State governments in itself shows that the magnitude of these incidents was not truly comprehended and was significantly undermined in terms of the propensity of damage caused. This calls for a more stringent monitoring and compliance regime in terms of reporting of chemical accidents. Further, there is a need for regulating the safe handling procedures in not only chemical laboratories and chemical manufacturing industries, but also in other industries which use chemicals as part of their production processes. In the Mayapuri incident, the effective radioactive emission management in the country was called into question. These emissions are almost similar to nuclear radiations in terms of their impact and long lasting effects it can cause on nearby inhabitants. With respect to the nuclear accident in particular, the Civil Nuclear Liability Bill had not come into effect at that time to deal with fixing of liability upon the operators. Despite the presence of two alternate legislations focussing on the workers welfare namely- the Unorganised Sector Worker's Social Security Act, 2008 and the National Policy on Safety, Health and Environment at Workplace, 2009, the nascence of the legal framework was evident as there was no comprehensive legal protection to the

workers in terms of compensation and dealing with the niche aspects of a radioactive emission accident response.³⁰

6.6 ISSUES AND CHALLENGES IN PRODUCTION, STORAGE AND TRANSPORT OF CHEMICALS IN INDIA:

The first and foremost point to state here is the indomitable difference between chemical accidents in factories and incidents due to accumulation of chemical waste. Both these events are results of two different reasons and have different cause and effects. Even the laws, regarding the same, are different. While one is related more towards harming the environment and human life for a period of generations, accidents due to chemical processes cause explosions, fires and leaks which lead to instantaneous destruction of property, loss of life and also percolate into the natural environment.

Storage and disposal of hazardous waste, is dealt with extensively under various rules and regulations formulated under the Environment Protection Act, which state the procedure in which they must be disposed off without causing pollution and harm. The chemicals being used actively in the industries are regulated and monitored by numerous statutes and not just the environmental laws, and are scattered all over the legal system. They are governed under the Factories Act, Disaster Management Act, Environmental Protection Act and Rules therein, and others. The principle of polluter pays applies largely and the concept of strict liability is exercised in the case of any leak of hazardous waste, during its handling and disposal. Whereas, heavy penalty and criminal liability is placed on the responsible person/s and companies, in case of a negligent act and/or omission causes an accident in a chemical factory, while the manufacturing process is underway. It is observed, under the laws governing the same, that a strict and stringent procedure describing the standard operating procedure in the case of an accident, and how it must be reported to all local authorities, the fire department, the disaster management team, state government, police and the state pollution control board and the reports

30 Babu P Remesh & C P Vinod, Radiation Incident in Mayapuri: Disquieting Signals to Labour, Economic & Political Weekly, July 24, 2010 Vol XLV No 30, Available at: <http://www.indiaenvironmentportal.org.in/files/radiation%20incident%20in%20mayapuri.pdf> (Last accessed on November 16, 2019).

which need to be submitted. States which have designated Major Accident Hazards³¹ have a special duty towards formulating such plans which detail about the handling of the situation, in case of an accident or incident. Up until recently, such reports have been made and carried out after the accidents have taken place in Maharashtra, Andhra Pradesh, Madhya Pradesh etc. but those reports, being voluminous in nature and submitted to numerous different bodies, are tough to locate. The industries however, keep a strict and detailed record of the chemicals they use, manufacture, import and export.

With the Government of India's long term plans of 'Make in India', 'Ease of Doing Business', developing Special Economic Zones and Exclusive Economic Zones, the industry dealing with chemicals is now largely becoming self-dependant and producing chemicals indigenously, therefore, considering a ban on such products does not seem to be a viable solution. It is however suggested that the records of industries carrying out the labelling, marking, observing the procedures and not indulging in flouting of the norms, along with the overall monitoring mechanism of the chemical industry, must be regulated and brought under one designated authority. This would greatly better the situation as the accountability, transparency and ease of channelling liability in case of any breach would become less tedious.

As can be understood from the accidents that have taken place, the biggest fall-out was the UCIL factory leak in Bhopal which caused tremendous loss of life and loss of faith among the citizens of India, whether the country's regulators are capable of handling the safety of the people. The company was in obvious breach of all safety parameters with the storage and handling of the chemicals and the infrastructure of the factory was obsolete, thus making the accident, a reality. However, in the past couple of years, there have been minor leaks and fire breakouts in the compounds of gas factories, chemical storage facilities, but the same have been contained and were not allowed to become major accidents. This shows the fact that the infrastructure and technology have come a long way in the developmental sense and it is possible to ensure safety of the workers as well as the inhabitants around the city. The challenge still happens to be within the regulatory mechanism, where information about the reports as filed, which department

31 Schedule 2 and 3 under the MSHIC Rules, state that when a site handles more than the threshold limit and amount of chemicals, the site is regarded as an MAH and is subject to reporting, safety audits and contingency plan requirements.

to spearhead in case of an accident, the channelling of liability (as most facilities are owned and run by the government) remains unclear.

Noting some of the most common challenges as expressed by the industries in the chemical sector³² is the absence of **adequate infrastructure including common facilities for scientific disposal of hazardous waste**. The main reason for issues arising from pollution in states such as Gujarat, Maharashtra etc which are hubs for the chemical industries, is the lack of these facilities. Secondly, the issue is **lack of financial resources, shortage of staff and skilled managerial support, and a lack of standardized protocols and authority**. The Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules 2016 provides that owners of hazardous waste disposal facilities are liable to pay financial penalties if the rules of transportation, storage, and recycling of such waste are not complied with, and may even be imprisoned due to negligence. The rules also specifically direct the state governments to identify locations for the construction of hazardous waste treatment facilities. However, no new sites have been built since the new rules came into effect. Many states like Karnataka, Kerala, Punjab, and Orissa do not have hazardous waste treatment facilities.³³ Through government schemes like the *Swachh Bharat Abhiyaan* the centre stage seems to have been taken by plastic waste management and solid waste management, thus, giving lesser impetus to hazardous and chemical waste management. **Lack of collated data** with the Central and State Pollution Control Boards about the quantity of hazardous waste and chemicals is another issue, as owing to the rapid growth in the industry, the use of chemicals and thus the rise in the existing hazardous waste, goes unnoticed. The nature of the chemicals and the very scientific nature of the rules governing them pose a challenge to the existing regulators such as SPCB, CPCB and NGT to understand and enforce them in the manner intended.

32 Available at: <https://www.smeventure.com/chemical-manufacturing-industry-india-challenges-opportunities/> and at <http://exportersindia.com/blog/opportunities-and-challenges-for-the-indian-chemical-industry.htm> (Last accessed on November 16, 2019).

33 The Associated Chambers of Commerce of India (ASSOCHAM) And Price Waterhouse Coopers (PWC). India Would Need to Bring 88 km² Land Under Waste Disposal by 2050: Study. 2017. Available at: <http://www.assochem.org/newsdetail.php?id=6350> (Last accessed on November 16, 2019).

6.7 THE MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, (MSIHC) 1989 AND CHEMICAL ACCIDENTS (EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE) RULES, (CAEPR) 1996: A CRITICAL APPRAISAL

It is not only under these rules that a system has been formulated to setup guidelines about chemicals in the country, but also under other laws, chiefly, the National Disaster Management Law as well. Various organisations and institutions in the private and not-for-profit sector as well have published the do's and don'ts. It was however, under the MSIHC rules that sites such as the MAH were established only to highlight the places where maximum amounts of chemicals and hazardous substances were present, so that those areas could be monitored more closely. The chief inspector of factories, under the factories act has to closely inspect and monitor the upkeep of these units and ensure that there are no violations with respect to the factory as well as in the safety of the workers. State provides for the necessary training programmes, workshops and capacity building programmes, to keep the management at these facilities up to date with the recent advances in safety. Various risk response systems and centres have been setup across the country to serve as a link between the District Crisis Group, as formulated under the CAEPR Rules, and the industry during an emergency. An inventory of 'isolated storages' with chemicals and their quantities in the country has been undertaken, the data of which is available on most state's pollution control websites, and the website of the Ministry of Chemicals and Fertilizers, the only issue is the regular updating and the authenticity of the data as provided. Some of the challenges as posed despite the enactment of these two rules, in the event of an accident are listed as follows:

1. ***Multiplicity of Rules, Regulations and Protocols:*** From NDMA (2005) to Factories Act (1947), Environmental Protection Act and rules, Labour Laws, Mining Laws etc, each statute has a prescribed format of reporting a mishap and due to which, there is excessive paperwork and management protocols which need to be followed. There is a dire requirement of a harmonized approach and incorporation of a single-window system in tackling the chemical industry.
2. ***National Level Risk Assessment:*** No one body assigned specifically for assessing and identifying the risks associated with the chemical industry, specially,

the manner of emergency response, collated data on storage extent of chemicals etc. and therefore, no insight into the forthcoming risks of the same.

3. ***Publication of Reports:*** Even though the regulations and statutes provide the making of and maintaining of the reports containing all important information with respect to the manufacture, import, export, storage of and the data regarding accidents and mishaps in chemical facilities, these reports are not made available to the public at large, easily. All that is available is the out-dated on-site emergency plans of industries and the off-site emergency preparedness of the factories which are not updated annually. Details of the safety audits done in the various kinds of chemical plants and factories are also not addressing the required safety requirements, and leaves most to individual discretion.
4. ***Updated Information on Education, Training and Capacity Development:*** It sure is not fair, that the industry today is growing in leaps and bounds, with technologically advanced patents and practices coming into the industry and more research and development happening to update the chemical industry while the capacity building as provided in the regulations remains the same and stays outdated. The infrastructural facilities in the installations need an upheaval.
5. ***Medical Preparedness and Response:*** The regulation, CAEPR, must contain some basic provision for medical preparedness as well. Ensuring by law, that trained medical professionals with required expertise shall be the first responders in event of a crisis situation. With too many levels of groups, it would only add on to the shifting of responsibility as to who shall be responsible for providing medical attention. It is in the report prepared by the National Disaster Management Authority where it states that the standard operating procedure at the incident site is not laid down. A specific medical preparedness plan is missing.³⁴
6. ***Overall Implementation Strategy for Existing Regulations and Procedures:*** Upon the observation of the precedent examples of the accidents, there is no clear information available as to which authority or body has taken the initiative

³⁴ National Disaster Management Guidelines, Chemical Disasters, 2007, page 18.

to prosecute the body liable for these accidents and what action was taken to prevent such accidents in the future. They do get reported, however, the eventual action as taken and the change in safety procedures do not find mention.

With most focus on the amount of compensation as received and the channelling of the liability, what loses focus and importance is the need for continuous improvement in the safety and security aspects. Keeping in mind, the role of the civil society, private players and the important role of the regulator, certain very strong steps on developing a strengthened institutional framework for this industry is a must. The CAEPR Rules need immediate amendment and addition of up to date factors for the collaborative effort of numerous bodies need to be put together. It is only then, that a wholesome and complete structure of monitoring, regulation and attempt at mitigating risks arising out of the handling and managing of the chemicals and hazardous substances would have been achieved.
